ELECTRICAL REVIEW

and WESTERN ELECTRICIAN with which is consolidated ELECTROCRAFT

VOL. 69. CHICAGO, SATURDAY, JULY 29, 1916 No. 5.

EDITORIALS

LET YOUR LIGHT SO SHINE.

The twenty-second annual convention of the Ohio Electric Light Association, which was held at Cedar Point last week, was in many respects the most successful of a long series held by the Association at the same place. The attendance exceeded 400 and the efforts of the Committee on General Arrangements resulted in a banquet that was enjoyed by all and was a marked contrast to some of its predecessors in the liveliness and enthusiasm displayed. The program contained few formal papers, but introduced two series of round-table discussions in addition to the usual reports of committees and formal addresses.

Of the latter, attention should be called to the address by Mr. W. W. Freeman, dealing with the public policy of utility corporations. Mr. Freeman emphasized the necessity for a company not only having a definite and progressive policy of dealing with its customers and the public, but of letting this policy be known to the public and be followed out by its employees. Mr. Freeman has had opportunity to see the results of a lack of this very thing. A few years ago he assumed management of a company toward which a certain fraction of the public entertained bitter and hostile feelings and this company, like many another, is now trying to live down the effects of the neglect of attention to this very important subject. Not only should a public utility have a well considered and well defined policy in its attitude toward the public, but to secure the desired results it is necessary that this policy be understood and be put in practice by every employee who comes in contact with the public or with the company's customers. Too often the efforts of a president or manager to cultivate the desired public sentiment in respect to his company is nullified by a lack of co-operation among the clerks behind the counter or the men who read the meters. The higher executives of a utility come in contact with but a very few of the company's customers in any but the very smallest communities, and the public seldom associates the personality of the responsible manager with the individuality of the corporation. The latter is regarded as a soulless creature without human traits and who performs acts which no human being would do. Only a carefully planned and executed attitude on the part of the minor employees, as well as the higher executives of a company, can bring the public to the belief that the aim of the public utility is first of all to serve the public, and that it desires to make this service satisfactory to every consumer upon its lines. A great deal remains to be done in the organization of most of the electric utilities to put the ideas of Mr. Freeman, which it is safe to say are shared by every progressive leader in the industry, into actual execution, but when this is accomplished a great deal of the present antagonism to utility corporations will be found to have disappeared.

THE TAXATION OF PUBLIC UTILITIES.

In one of the round-table discussions at the convention of the Ohio Electric Light Association, Mr. Elam Fisher considered this subject, pointed out that the public utilities of Ohio represent the only industry where companies are taxed as going concerns, and made a plea that the members of the Association work to have other concerns taxed upon the same basis in order to secure greater equity for all. The present valuations penalize the public utilities, since manufacturing plants are usually valued only at their minimum physical valuation, although their values as going concerns may be quite as large in proportion as those of the utility properties.

The constitution of Ohio, like that of many states, and especially the newer ones created out of our western territory, requires the equal taxation of all forms of property, a requirement which it has been found impossible to carry out in practice. The result is general dissatisfaction with taxation and the desire and effort upon the part of most of those concerned to avoid taxes as far as may be possible. The impossibility of carrying out the provisions of a general-property law has been well illustrated by recent developments in Texas, where even a court injunction failed to secure the desired result in the city of Houston. The only remedy for this state of affairs seems to reside in constitutions and laws which will permit the classification of property for the purpose of taxation, and conditions of assessment which do not leave it to the honesty or judgment of the individual taxpayer as to what his assessment should be.

In the past there has been a well-grounded desire in certain quarters to regard utility corporations as the owners of special privileges having great value, and to tax them in proportion to those values. So long as utilities were free to charge whatever rates they might desire, their franchises did indeed represent great values, either actual or potential, which naturally invited a tax of this character. With the general adoption of the regulation of rates and service of utilities by government commissions, this condition has been

largely done away with, and there is no longer any reason why the franchise or going value of a utility corporation should be regarded as an especially suitable subject for taxation.

The natural tendency of imposing a tax upon any object is to discourage it. It is with this idea in mind that special taxes are levied upon saloons and upon dogs. On the other hand, the state of Pennsylvania has, by exempting machinery from taxation, greatly encouraged the manufacturing industries of the state, and helped its large cities to be numbered among the foremost manufacturing centers of the world. Other states might well follow this example, extending the principle not only to machinery, but to all portable equipment which is useful in the production of wealth or the service of the community. This would include not only the power plants, but the line equipment of electric utilities, as well as other forms of personal property. Several states have already taken steps, or are about to take them, which will permit the exemption of personal property from taxation and Ohio would do well to join in this movement. The central stations of the state, as elsewhere, can greatly help their own situation, as well as that of many large power-consuming customers, by joining in a movement to bring about this result which, while securing greater justice in taxation, would at the same time encourage manufacturing industries which use central-station service.

IMPROVING CONTRACTING CONDITIONS.

That no business can be permanently operated upon a basis of supplying commodities or service at less than cost, unless subsidized or endowed, is axiomatic. That it cannot be done by the electrical contractor has been often demonstrated. Contracting for even a single job at less than cost means that other jobs must pay excessive prices, that the job is skimped, or the contractor's creditors must go unpaid. No business can be properly and intelligently managed and operated without a knowledge of costs. This thought has been many times repeated in these columns, but it will bear repetition again in connection with the article by Mr. A. C. Lyons in this issue.

This paper was read by Mr. Lyons before a meeting of electrical contractors in Toronto, and shows what has been accomplished through co-operation and a calm investigation of facts in clearing the electrical atmosphere of Brantford. Former conditions in Brantford were similar to what may be found in hundreds of towns in this country, but intelligent and determined work bids fair to transform those conditions to such as will not only lift the plane of electrical contracting, but improve the other branches of the industry as well, and accelerate the wider use of electrical energy.

The first essential step for the electrical contractor in improving his condition is to become thoroly familiar with his costs; the next is to work in co-operation with his competitors. When these two steps have been accomplished, and not before, he is in position to discuss the problems which involve the other branches of the industry, and move toward their satisfactory solution.

That a satisfactory solution of the relations between the various elements of the industry can be worked out is indicated not only by the experience in Brantford, but by the developments which have taken place in the Pacific Coast States. These examples should stimulate contractors in other sections to an effort to achieve similar results, and encourage them to persist until all obstacles are overcome and satisfactory results accomplished.

PUBLICITY AS TO RATES.

The time is not long past when central stations generally gave as little publicity as possible to their schedules of rates, and many consumers in one class did not even know what other consumers in different classes were paying for their electrical energy. Indeed, in the case of the power load, a separate and different contract was frequently made with each customer depending upon the conditions of use.

With the general inauguration of regulation by commissions, definite rate schedules have been adopted almost everywhere and every consumer is entitled to the same rates accorded any other consumer in the same class. Most companies have their rate schedules in printed form for distribution to any one who may be interested therein. There has been a general tendency, however, to avoid the publication together of the rates of different companies so that direct comparisons could be made.

The general attitude toward this subject is undergoing a rapid change. It is realized and generally understood that the conditions which go to determine rate schedules are different in nearly every community, and that similar rate schedules cannot be expected where the conditions are different. There is little difficulty in explaining the differences between different rate schedules, and consequently the publication of rates in a way which permits of such comparisons has lost most of its objections. It is especially desirable that the rate schedules of different companies should be available and known to those who are in a position to study rates and to take up rate problems in their own companies. For this reason the Rate Research Committee of the National Electric Light Association has for some years favored the greatest publicity for rate schedules, and has systematically published in *Rate Research* such new schedules as have been established by the various member companies from time to time.

Other students of the same subject are seeing the desirability of this procedure and the action for greater publicity is being advocated in different quarters. The proposal has been made by the secretary of the Ohio Electric Light Association that the Association publish the rates of all the companies operating in the state of Ohio, and it seems extremely probable that this will be done in the near future.

PRICE TAGS FOR APPLIANCE SALES.

The effect of price labels on the minds of persons contemplating the purchase of any commodity has been the subject of many so-called psychological studies in advertising. The question as to whether a plain, conspicuous price, a modest, shrinking one, or no price at all, shall be attached to an article is a debatable one, with a good deal to be said on both sides. There is little question, however, that in a window display the conspicuous price tag is to be preferred. People often are loath to enter a store and ask the price of an article displayed in the window. Others do not care to take the time and run the risk of waiting for a clerk. Men, especially, are chary about walking into a store and asking how much any object is sold for; they fear the price may be higher than they care to pay, and are sensitive lest they be branded a piker. There is no question that an object plainly labeled often sells itself, especially when it is located where it can be viewed and studied so that its intrinsic merits will impress the prospective purchaser with its value.

An important question in regard to labeling is what sort of tag shall be used. The salesman of a large electric shop advises never to give any suggestion of an attempt to deceive, even through a clever placing of figures. If an object is offered at $4.98, do not have the 4 printed in a bold, dashing character and the 98 in tiny figures scarcely legible from a short distance. This expedient merely exasperates the would-be buyer.

But is it well, indeed, to use the bargain-counter plan of price-making? The $1.99, $2.98, $3.47 prices may appeal to habitués of the bargain counter, but it is very doubtful if the cut-price idea is desirable in electric sales. It suggests the existence of competitors who charge "even money;" it also suggests held over or damaged goods, or goods which may have been overstocked for the season's trade. Better, we think, the price in dollar units or major fractions thereof.

A Philadelphia electric shop is carrying a window display featuring a junior fan at $5. The price cards attached are snug, and the figure compact, but plain This strikes one as being a modest price, and we doubt if a $4.98 price label would impress the passer-by as favorably. Fan purchasers, and in fact, the buyers of any sort of domestic electrical appliances, are not cheap-goods hunters. They are looking for value and are willing to pay a fair price for the thing they want.

This leads to the subject of what descriptive matter displays of appliances should carry. It is clearly evident that it should be concise, and express as briefly and forcibly as possible the idea which the seller seeks to convey. It goes without saying that a catch-phrase or description should read correctly and be properly punctuated. One occasionally sees a sign reading something like this: "Please knock bell out of order," on a residence door. Equally absurd labels have been attached to goods offered for sale. The intelligent sign maker is doubtless right in believing that window cards should be severely simple—in black letters on white, or another equally clear contrast.

COMMERCIAL ADVOCACY OF THE METRIC SYSTEM.

Our system of electrical units is international in character and is so closely connected with the metric system that electrical engineers generally recognize the advantages of the metric system for general use and many of them are among the most ardent advocates of its adoption. Much of the opposition to the general introduction of the metric system of weights and measures in this country has come, however, from engineering manufacturers who look with apprehension upon the temporary loss that may be occasioned by drawings and machine tools which may have their usefulness lessened or entirely destroyed by a change in units of measurement. The opposition which has come from the commercial world has been mainly due to ignorance and prejudice. Now that a national movement is well started for the general increase of export trade, there is a growing recognition upon the part of all commercial interests that the country suffers a severe handicap by adhering to the illogical and inefficient English units which we have inherited from our forefathers.

We consequently note with interest the recent action of the National Wholesale Grocers' Association. Following the submission of a report by a special committee at its Boston convention, every wholesale grocer has been urged to print on the labels of canned and boxed goods not only the weight in English units but also the metric equivalent. This will make the goods more acceptable in export trade and it will also assist in the general process of making Americans familiar with these units. This will be especially true if the weights are so chosen as to be integral numbers of metric units, and this will be the more possible since very few packages are at present marketed which contain exactly one pound. The Association is also taking measures to show its members how the transition can be made with the least difficulty.

The report referred to also touches upon one of the difficulties which has stood in the way of the introduction of the metric system in this country, and that is its faulty presentation to school children. Instead of being taught by and for itself, the metric units are usually introduced in connection with their English equivalents, and the conversion factors thereby involved cause the system to look complicated and largely mask its great advantages and simplicity. The relation of units of the same kind and the relation of units for different quantities do not show to such advantage when complicated by their intricate relations to the English units.

That commercial men should interest themselves in this connection and take active measures to push it augurs more for the ultimate adoption of the system in this country than the many arguments which have been made before Congressional committees and in other places.

Happenings in the Industry

Manufacturers Meet in New York—Report of National Electrical Contractors' Convention and Impressions of Convention by Ernest Freeman—Convention Report of Ohio Electric Light Association at Cedar Point—California Electrical Contractors and Dealers Hold Successful Convention at Stockton—Waterpower Conference in Tacoma

Associated Manufacturers of Electrical Supplies Hold Meetings.

The board of governors of the Associated Manufacturers of Electrical Supplies held a meeting on July 12, at the Hotel Nassau, Long Beach, Long Island. There was a full attendance and many matters of importance were discussed. This will be the last meeting of the summer, and the board will not hold another meeting until the latter part of September, the time and place for which meeting has not as yet been decided upon.

The interior conduit section of the Associated Manufacturers of Electrical Supplies held a meeting on July 18, at the Hotel McAlpin, New York City. Practically all members of the section were present. D. H. Murphy, president of the American Conduit Manufacturing Company, Pittsburgh, Pa., was elected chairman of the section. Oscar Hoppe, of the American Circular Loom Company, New York City, was elected secretary and Russell Dart, of the Alphaduct Company, Jersey City, N. J., was elected treasurer. A number of sub-committees were appointed and many activities planned for the coming year, which it is felt can only result in a great deal of benefit to all members and to the industry as a whole.

Utah Power & Light Company Will Build Another Plant on the Bear River.

The Utah Power & Light Company has commenced the construction of a new hydroelectric plant to be located on the Bear River in Idaho at Cove, about one and one-half miles below the company's present Grace plant. A force of 350 men are already on the ground and at work on the foundations, flume and dam. This number will be increased, it is said, in the near future to 450 and work on the power house, dam and flume will be pushed vigorously during the summer and fall months and it is expected the station will be completed in May, 1917. This new plant will be the fourth owned by this company deriving its power from the Bear River. The company's hydroelectric system on this waterway begins at the Bear Lake, which is used as a natural storage reservoir. A canal carries the water of the lake back into the river at those seasons of the year when the water is low. In order to augment the work of the outlet canal, the power company is now constructing an electrically operated pumping station between Mud Lake and Bear Lake. Five electrically driven pumping units, having a capacity of 1,500 second-feet, will be installed at this plant, which is known as Lifton.

A feature of the company's work on the Bear River is the fact that all of its development work has greatly aided the irrigation plants deriving their water from the Bear River.

Portland Sections Hold Joint Meeting.

The regular joint monthly dinner meeting of the Portland (Ore.) Section of the A. I. E. E. and the N. E. L. A. was held in Portland, July 11. M. E. Cheney, of the Washington Surveying and Rating Bureau, addressed the meeting on "Scientific Construction of Utility Insurance Rates." A new draft of the by-laws was considered by members of the Portland Section of the A. I. E. E.

ELECTRICAL CONTRACTORS' MEETING.

Concentric Wiring, Insurance and Other Topics Discussed at Sixteenth Annual Convention in New York.

What is claimed to be the most productive and at the same time enjoyable convention ever held by the National Electrical Contractors' Association was the sixteenth annual meeting held at the Hotel McAlpin, New York City, July 17 to 22. The work of the convention is largely accomplished at business sessions which are open to members only and, while considerable business was transacted looking to the improvement of conditions in the electrical contracting business, with particular regard to labor and merchandising, the real work is performed by committees who work continually the entire year.

The subject of concentric wiring was discussed at an open meeting on Thursday morning and while no definite conclusions were drawn or no final action taken it was the consensus of opinion that concentric wiring is merely the beginning of a movement which is destined to play an important part in future extension work.

The convention was opened on Wednesday morning with an address of welcome by Lewis H. Woods, president of the New York State Association. An eloquent response was made by John R. Galloway, president of the National Electrical Contractors' Association, in which he called attention to the important position which the electrical contractor holds in the electrical industry.

An address was made by T. C. Martin, secretary of the National Electric Light Association, which dealt largely with the co-operation essential between central stations and contractors. During the past 25 years there has been a great deal of co-operation which is in a measure responsible for the annual increases of 15 to 20 per cent which are being made by central-station companies. However, there is a great field for future development, particularly in house wiring, and co-operative effort is necessary to accomplish the greatest results. Mr. Martin laid emphasis on the educational and publicity work which the central-station industry is continually carrying on. He said the industry is spending from $2,000,000 to $3,000,000 a year to teach the public the desirability and convenience of electricity. This work benefits other interests as well as the central station and the contractor should reciprocate by working hand in hand with the utility company.

Arthur Williams, of New York Edison Company, next delivered a very interesting address in which he pointed out the importance of the electrical contractor in a community. In many ways the contractor comes in closer touch with the public than the central station and to a very great extent the volume of the central station's business depends upon electrical contractors. This is particularly true in New York, where all wiring and construction work is turned over to electrical contractors and where all requests for electrical devices and supplies are referred to dealers in the customer's vicinity.

The position that the National Electrical Contractors' Association should take in regard to national legislation was pointed out in an address by Edward Trefz, secretary of the Chamber of Commerce of the United States, Washington, D. C. He urged the Association and individual contractors to take an interest in business legislation which is now pending and which in the future will be proposed and to join with other business interests in endorsing the work of the Chamber at Washington.

The work which the contractor should do to aid in making

America's Electrical Week a success and benefits which will accrue were pointed out in an address by H. W. Alexander, of the Society for Electrical Development. He outlined the plans for the forthcoming celebration. He referred to the success of Electrical Prosperity Week last year and to the actual results which were accomplished. The plans for this year are more elaborate and provide for greater participation by contractors and dealers.

Concentric Wiring.

At the open meeting on Thursday morning the first order of business was the report of the Insurance Committee presented by Joseph A. Fowler, of Memphis. This was followed by an address by L. T. Block, manager of the Utilities Indemnity Exchange, St. Louis.

Ernest McCleary, of Detroit, then presented the report of the National Code Committee, which was followed by a discussion on concentric wiring. In introducing this subject Mr. McCleary outlined its history and the connection which the Contractors' Association has had with it. He urged that contractors approach the subject honestly and with open minds.

J. R. Strong, of New York, opened the discussion on this

Robley S. Stearnes.

subject by outlining the activities which have been undertaken by various interests and which are responsible for the present condition of affairs. He said that a bare grounded-return system involved radical changes in the manufacture of wire and wiring devices and there was necessarily a great amount of preliminary investigations of European practice before a Committee of Underwriters could formulate tentative rules for this wiring. One of the first problems was to determine what constitutes a permanent satisfactory ground and there is still considerable difference of opinion on this subject. Mr. Strong referred to several trial installations that he has inspected and thought that from the standpoint of appearance a knob or porcelain-cleat installation is more desirable. He also declared that the economies expected might be more simply obtained by a bare grounded-return system. The Underwriters have limited concentric wiring to branch circuits that are exposed. Mr. Strong felt that if this system was feasible at all it should not be limited only to branch extensions but should be made universal. He thought that if it was desirable as many seem to think, that the cost of wiring be reduced, contractors should give serious consideration to the grounded-return system and if this was found unsatisfactory in practice, investigate other systems.

H. R. Sargent, of Schenectady, referred briefly to the conditions which have led to a consideration of concentric wiring. Central stations have reported, he said, that only 10 per cent of the homes located adjacent to their system were wired for electricity. The reason advanced in many cases was that the cost of wiring was so high as to be prohibitive. As a result concentric wiring, which has been used for some time in numerous European countries with great success, was investigated and thought the most satisfactory for this country. However, numerous changes were found necessary in the manufacture of concentric wiring material for use in this country and the factor of safety greatly increased over European practice. Mr. Sargent claimed that he was not prepared to say that concentric wiring will materially cheapen construction, but he thinks it will certainly look neater than ordinary exposed wiring, which is comparable in cost. If such a system makes it possible to wire the small residences, the contractors' business will be materially increased. However, he said that if concentric wiring is found not to be the proper system for this country, the central stations, contractors and manufacturers should get together to decide on some other system. Speaking for the manufacturers Mr. Sargent said they would be very glad to co-operate in developing some system of wiring that will reduce the cost.

Messrs. Fish, Adams and Wheeler also discussed the subject from various points of view. One speaker thought that it would be unnecessary to adopt cheaper wiring if central-station companies would eliminate the minimum charge for small residences. He also thought that considerable additional business could be secured if rates were reduced. Another speaker thought that where customers are allowed 12 or 24 months in which to pay for the cost of wiring the few dollars additional did not make much difference. However, the cost of energy is the deciding factor in many cases. It was pointed out by Mr. Wheeler that the cost of meters and reading meters and billing and collecting makes the minimum charge necessary. It was found over an extended period that the cost of billing and collecting in New York amounted to 48 cents per month per customer. It was also brought out that cost of making a permanent and satisfactory ground would in many instances bring the cost of the concentric installation above that of a knob-and-tube job.

In closing the discussion R. S. Hale, of Boston, stated that concentric wiring is only a small portion of a very broad and important subject. It is essential to reduce the cost of electrical construction particularly in smaller houses and if it cannot be done by concentric wiring, then some other method must be found. What is needed he thought was constructive criticism rather than destructive.

Election of Officers.

At the session on Friday morning the ticket presented by the Nominating Committee was unanimously approved and the following were declared elected for the ensuing year.

President, Robley S. Stearnes, New Orleans, La.
First vice-president, W. K. Tuohey, Springfield, Mass.
Second vice-president, J. C. Rendler, Los Angeles, Cal.
Third vice-president, J. T. Marron, Rock Island, Ill.
Treasurer, James S. Hilton, Syracuse, N. Y.
Secretary, George H. Duffield, Utica, N. Y.
Assistant secretary, Harry C. Brown, Utica, N. Y.
Sergeant-at-arms, James F. Burns, Schenectady, N. Y.

New Orleans in 1917.

At the meeting of the Executive Committee it was decided that the convention in 1917 should be held at New Orleans, La., during the week of October 10. It was previously decided to hold the convention during the third week in October, but the date was changed in order not to conflict with the annual convention of the Jovian Order, which is held at this time.

Entertainment.

Although the annual convention is essentially a business meeting, one of the important features is the opportunity afforded to meet on a social basis, and this feature was carried out on an elaborate scale at the New York meeting. There were business meetings of the Executive Committee and Board of Directors on Monday and Tuesday. On Wednesday evening the annual reception and dance was held at the Hotel McAlpin, an elaborate entertainment program being provided. On Thursday evening there was an automobile trip to Coney Island, dinner being served at the Brighton Casino. A tour of the various amusement resorts was made and the return made in automobiles, arriving in New York shortly after 11 o'clock.

One of the most enjoyable features of the entertainment program was the excursion to Long Beach on Friday afternoon. A special train was run on the Long Island Railroad, leaving at 3 p. m. Upon arrival at Long Beach there was a varied program of bathing and other amusements culminating in a dinner-dance at the Hotel Trouville.

On Saturday there was a steam boat excursion around Manhattan Island, luncheon being served aboard boat. The latter feature was under the auspices of the New York central-station companies and the Electrical Contractors' Associations of New York City.

Exhibits.

One of the interesting features of the convention was an exhibit of electrical material in the Terra Cotta Room of the Hotel McAlpin. Much ingenuity was shown by the various exhibitors in utilizing the space available to the best advantage and arranging exhibits that were extremely interesting to all in attendance. A brief account of the various exhibits is given elsewhere in this issue.

Canada to Equip Parks with Radio Service.

Philip E. Edelman, 1802 Hague Avenue, St. Paul, Minn., has been engaged by the Canadian Government as electrical engineer to prepare plans for wireless telephony and telegraphy installations to secure communication in the extensive Dominion Parks of Western Canada. The installation will be the first of its kind and a new application of radiocommunication. The equipment will be of new design specially adapted for the difficult mountain service.

Impressions of the Contractors' Convention

By Ernest Freeman

So much is accomplished at the annual conventions of the National Electrical Contractor's Association that it would be virtually impossible in a few words to give an adequate idea of what these meetings mean to the men who attend and to the industry in general. There is, of course, a great amount of important business transacted, but this is only one feature of convention work. Equally as important is the opportunity these gatherings afford to meet the men in the business—the men who are doing the big things.

Many a new member has considered his trip well repaid, not only by the ideas and help gained on the convention floor, but by the friendships formed and the acquaintances made outside of the meetings. Hence the social side of these conventions is justly given a great deal of attention.

The meeting at New York last week was a fitting successor to the 15 conventions which preceded it. A little reflection on the part of those who have returned after partaking of the hospitality of New York, leaves uppermost in our minds the thought that the Convention Committee is deserving of a great deal of credit for their splendid and untiring work.

There is one thing that impressed me about the New York convention, as in other years, namely, that the members of our Association who go to the convention are always satisfied with the Association. It is also a significant fact that year in and year out the same men are to be seen with, of course, new faces here and there. Among these regulars may be mentioned Ernest McCleary, J. S. Hilton, J. R. Strong, Henry Newgard, Herman Andrae, W. C. Peet, John R. Galloway, C. A. Arnold, William McGuineas, Richard Poelma, J. F. Burns and others. It is also significant that these men are the representative contractors from all over the United States and certainly they must get something from the meetings or otherwise they would not continue to come year after year.

It is difficult for a new member to realize at first the extensive work which the Association is doing in the interest of the electrical contracting business. At numerous sessions I have seen new members arise to advance what they considered a new idea or to register a complaint about some phase of work only to have them presented with facts and figures showing that the Association had made a careful analysis of the situation, whatever it might be, and is prepared to furnish the information to its members. The Association is constantly working on problems, many of which the members at large are unaware of.

At the session on Thursday morning there was a discussion on concentric wiring and I feel that this was one of the most important features of the convention, insofar as general interest is concerned. Contractors as a class have been somewhat opposed to concentric wiring. The discussion indicated a strong tendency, however, to develop a system which would have the advantage of low cost, but none of the apparent disadvantages of the system proposed. It was also evident that the contractors would not approve of concentric wiring although they agree that it will, perhaps, be a stepping stone to a co-operative effort on the part of the entire industry to develop less expensive construction.

Although having no official connection with our convention the exhibit maintained by the manufacturers must certainly be considered significant. The display was very comprehensive and educational and was arranged entirely between the manufacturers and the hotel. It must indicate a growing tendency on the part of the manufacturers to seek the co-operation of the contractors who, they realize, represent a tremendous purchasing power and an influence that means much in the development of new material. In virtually all cases the contractor is the ultimate deciding factor in the use of new equipment, although the architect's specifications may call for this material.

The Association, of course, will feel a distinct loss by the retirement of President Galloway, who has had an exceptionally successful administration. The presentation of the insignia of the past president's office to Mr. Galloway at the last session emphasizes this fact upon us. Mr. Galloway was the second past president to receive this emblem. The retirement of Ernest McCleary, of Detroit, from the chairmanship on the Code Committee is also a serious loss which will be keenly felt by the Association. Mr. McCleary has been one of the hardest workers in the interest of the Association and it is doubtful if the extent of his work will ever be fully known.

CONVENTION OF OHIO ELECTRIC LIGHT ASSOCIATION.

Enthusiastic Meeting at Cedar Point.

Municipal ownership of utilities and the public policy of utility corporations were the most prominent subjects of discussion at the twenty-second annual convention of the Ohio Electric Light Association, held at Cedar Point, O., July 18 to 21. In a talk upon municipal ownership at the opening session, D. L. Gaskill gave the following causes of failure of municipally owned plants: bad management, lack of finances, absence of self-interest in the management, disregard of service, change in governing bodies, inadequate equipment, failure to keep pace with the advances in the industry, and political exploitation. There are four causes which account for the origin of municipal utilities: no other service available, poor service, street lighting poorly carried out, and high maximum rates and minimum charges. In Ohio the greatest number have arisen from the first cause, while the second is fast disappearing. Street-lighting contracts are a potent source of dissatisfaction.

At the session on Wednesday afternoon, E. Burt Fenton, of the W. S. Barstow Company, read a paper on "The Missing Link," in which he analyzed business into investment, production and distribution or selling. When Government attempts business, it finds the selling organization lacking, and unless the business consists in supplying a necessity, it becomes a failure.

At the same session W. W. Freeman made an address on "The Public Policy of a Utility," in which he stated that every utility should have a definite policy in its attitude toward the public, and it should be widely known to employees and to the public. The primary duty of a utility corporation is to serve the public, in return for which it is entitled to adequate compensation. To be adequate, compensation must include enough profit to attract additional capital. It is a mistaken policy to let it appear that a utility gives away privileges to consumers, although concessions may properly be made for a definite purpose. Utilities should be identified with the individuals managing them, like any other business. The manager should take personal responsibility, and this would avoid some of the abuse heaped upon utility corporations. Ohio needs legislation giving the Public Utilities Commission original jurisdiction as to rates, instead of on appeal.

In discussing this subject, Secretary D. L. Gaskill pointed out that the publicity policy of the steam railroads is having a good effect.

At this session George B. Muldaur, traveling secretary of the National Electric Light Association, also made an address, urging the formation of company sections.

The first session of the convention was called to order by President W. J. Rose on Tuesday afternoon. Following the presidential address, the reports of the secretary-treasurer and Executive Committee, and the reading of telegrams from Col. C. V. Hard and Frank M. Tait, the Illumination Committee presented a set of tentative specifications to accompany street-lighting contracts, which called forth an animated discussion. The report was presented by S. E. Doane, and was discussed by L. C. Anderson, of Middletown; J. C. Martin, of Columbus; Weare Parsons, of Springfield; I. L. Oppenheimer, of Pomeroy; G. E. Miller, of Cleveland; O. H. Hutchings, of Dayton; H. G. Bonner, of Elyria; W. W. Freeman, of Cincinnati; D. L. Gaskill, of Greenville; A. A. Pointer, of Fort Wayne, Ind.; and E. A. Bechstein, of Sandusky. The report was referred back to the committee to continue the work.

A feature of the convention was the "Round Table" discussions of selected topics. At the first of these, on Tuesday afternoon, J. C. Martin spoke on "Legislation Needed by Company, Consumer and Public," emphasizing the need that municipally owned utilities be required to use the same system of accounting as private utilities, that the entire utility law apply to municipally owned utilities, and the need for an indeterminate franchise.

Elam Fisher spoke on "Taxation of Public Utilities," pointing out that only utilities were taxed as going concerns, whereas all other industries should be treated just the same as utilities, without discrimination.

Commercial Day.

Another "Round Table" discussion was held on Thursday morning, the session being devoted to commercial topics, opening with the report of the Committee on New Business Cooperations, which was presented by J. E. North and discussed by F. B. Steele, of Dayton; W. A. Wadsworth, of Cincinnati; Paul H. Stambaugh, of Youngstown; Thomas F. Kelly, of Dayton; W. R. Power, of Ironton; W. Parsons, of Springfield; H. B. Bixler, of Akron; and J. G. Learned, of Chicago, Ill. The discussion had to do principally with the committee work and the winter conferences.

S. E. Doane then spoke on "From Barter to Business Through Standardization," pointing out the advantages of standardization to all kinds of business.

Thomas F. Kelly spoke on "Deposits From Customers," pointing out that the law permits a company to require deposits from customers where there is no other security for payments, such deposits drawing six-per-cent interest when retained for more than six months. Credit should be extended to four classes of customers: (1) where service has previously been used and bills paid promptly; (2) when the customer owns real estate in the county; (3) when he has a satisfactory credit rating; (4) when he has the guarantee of a property owner.

H. C. Gillie read a paper by M. E. Turner entitled "Financing Installations for Contractors by Banks in the Wiring of Old Houses." This described the installment plan of collections by a bank, which advances half of the contract price to the contractor. The plan was started in 1906, extended to stores in 1913, and altogether over 20,000 buildings have been wired, and 30 contractors have used the plan.

W. A. Wadsworth spoke on "Giving Free Electric Units in Exchange for Gas Arcs." This was shown to be advantageous under proper limitations. One thousand units have been placed in Cincinnati in two months.

H. O. Loebell spoke on "Electric Heating," which he said had passed the experimental stage, and offered great possibilities in many industries, regardless of the temperature desired. Large loads of this type will soon be offered central stations almost regardless of cost per unit, on account of its advantages and the lessening of labor costs. The central-station man must understand heating and also the operation to which it is to be applied, in order to handle this business successfully. The problem must be approached in a different manner than when fuel is used for heating.

These papers were discussed by F. C. Caldwell, of Ohio State University; Frank Glosser, of Marion; and H. J. Hoover, of Cincinnati.

Technical Session.

The session Wednesday morning was devoted to reports of the Station Operating Committee and the Transmission and Distribution Committee. The first report was presented by Henry B. Dates and was discussed by L. C. Anderson, of Middletown; D. L. Gaskill, of Greenville; O. H. Hutchings, of Dayton; Benjamin Greenfield, of Toledo; Elam Fisher, of Eaton; F. C. Caldwell, of Ohio State University; W. J. Rose, of Alliance; M. H. Wagner, of Dayton, and I. L. Oppenheimer, of Pomeroy.

The report of the Committee on Transmission and Distribution was presented by M. H. Wagner, and was concerned with the apparatus for serving customers along the route of a transmission line. The various elements of an outdoor substation, such as an air-break switch, choke coil, fuse, lightning arrester, transformer and feeders, were considered. This report was discussed by G. N. Lemmon, of the Railway & Industrial Engineering Company; H. W. Young, of the Delta-Star Electric Company; W. F. Sneed, of the General Electric Company; F. C. Caldwell, of Ohio

State University; D. L. Gaskill, of Greenville; Karl A. Katzenberger, of Lewisberg; A. A. Pointer, of Fort Wayne, Ind.; F. W. Funk, of Youngstown, and Kenneth L. Wilkinson, of the American Telephone & Telegraph Company.

In connection with this report, exhibits were made upon invitation of the committee by the Railway & Industrial Engineering Company, Delta-Star Electric Company, Ohio Brass Company, Standard Underground Cable Company, Locke Insulator Manufacturing Company, The Archibold-Brady Company, Holtzer-Cabot Electric Company, and W. N. Matthews & Brother. A vacuum cleaner was also exhibited by the Federal Electric Company.

At the session on Thursday afternoon an address was made by M. R. Bump on "Power Developments in the Last Ten Years and Their Effect Upon the Electrical Industry." He referred to the rapid development of the power load which now constitutes the major portion of the central-station business, whereas formerly lighting was the largest element. The transition from retail to wholesale business is now going on and a much larger revenue per capita may be looked for in the future. Mr. Bump predicted the centralization of power generation at coal mines and the extension of railroad electrification. R. H. Grant, of the Domestic Engineering Company, then gave a talk on "Selling."

Election of Officers.

The final session of the convention was held on Friday morning. The report of the Nominating Committee was first received. This committee consisted of G. E. Miller, H. G. Bonner, E. H. Beil, E. A. Bechstein and W. A. Wadsworth. The report of the committee was accepted and the following were elected: President, E. A. Bechstein, Sandusky; vice-president, O. H. Hutchings, Dayton; secretary-treasurer, D. L. Gaskill, Greenville. Advisory Committee: W. W. Freeman, Cincinnati; R. P. Stevens, Youngstown; E. P. Mathews. Finance Committee: A. L. Thuma, Ironton; I. L. Oppenheimer, Pomeroy; E. L. Franklin. Executive Committee: T. O. Kennedy, Massillon; E. H. Beil, Youngstown. The following chairmen of committees were appointed, each chairman to choose the members of his own committee: New Business, J. E. North, Springfield; Meters, A. H. Bryant, Cleveland; Illumination, S. E. Doane, Cleveland; Transmission and Distribution, M. H. Wagner, Dayton; Insurance, L. K. Funkhouser, Dayton; Standardization of Voltages, S. E. Doane, Cleveland; Advertising, T. F. Kelly, Dayton; Station Operation, Henry B. Dates, Cleveland.

George V. Hill, of the Society for Electrical Development, then made an address.

The report of the Meter Committee was presented by A. H. Bryant and was discussed by H. B. Bixler, of Akron; S. E. Doane, of the National Lamp Works; F. B. Steele, of Dayton; Samuel G. Hibben, of the Westinghouse Electric & Manufacturing Company; C. I. Hall, of the General Electric Company; A. M. Seeger, of Toledo; John K. Himes, of Dayton; Adrian Tobias, of Youngstown; F. C. Caldwell, of Ohio State University; R. S. Graves, of General Electric Company; O. W. Jones, of Columbus, and John Gilmartin, of Detroit, Mich. In connection with this report there was an exhibit of meters by the General Electric Company and the Westinghouse Electric & Manufacturing Company.

The report of the Committee on Standardization of Voltages was then presented by G. S. Merrill. This was followed by the report of the Auditing Committee, which consisted of O. W. Holland and J. T. Kermode.

An address was made by Martin J. Wolf on "Jovianism and Its Relation to the Electrical Industry." After passing a number of votes of thanks to those who had helped make the convention a success, the meeting adjourned.

The total registration at the convention was 406.

Entertainment.

The entertainment features were well arranged and special credit is due the Committee on General Arrangements for arranging banquet features that far surpassed any previous year. A number of souvenirs were distributed and entertainment was provided by Mr. Haggerty, of the Cleveland Telephone Company; Miss Vida N. Cotabish, of Cleveland; T. J. Dresser, of the H. W. Johns-Manville Company; R. S. Dunning, C. S. Ripley, J. R. Ewing, B. J. Ballard and R. E. Grether. The committee consisted of E. A. Bechstein, A. A. Serva, G. E. Miller, G. S. Vail, C. J. Ratterman, W. S. Culver, H. J. Hoover and W. E. Richards.

The usual ball was held on Thursday evening and was preceded in the afternoon by a beach party and water sports. Box-ball and card parties and musicales were provided for the ladies on the various days of the convention. On Thursday evening the Jovians held a rejuvenation under the auspices of the Sandusky Jovian League.

A unique and interesting feature of the convention was the publication of a four-page humorous daily, entitled *The Lightning Bug*. This sheet boasted a large editorial staff, but we understand the real work was done by E. Burt Fenton, with the aid of W. A. Hein as cartoonist. Four issues appeared and created great amusement.

California Association of Electrical Contractors and Dealers Holds Annual Convention.

The seventh annual convention of the California Association of Contractors and Dealers was held at the Stockton Hotel, Stockton, Cal., July 14 to 16. This convention brought together more men of the electrical fraternity than any previous meeting of this Association; there were also more practical and helpful papers and discussions and more enthusiasm than at any previous meeting. Representatives were present from every part of the state and all went home with pleasant memories of the meeting.

The first session was called to order on Friday morning by President C. V. Schneider, of Sacramento, presenting M. A. DeLew, chairman of the Convention Committee, who presided. Mayor Alex Oullahan, of Stockton, made the address of welcome. Albert H. Elliot, of San Francisco, responded to this address, stating that the fundamental idea of an association is co-operation. The movement is co-operative in the sense that it is built on the maxim, "We for all and all for we," and stands for intelligent, voluntary, hearty co-operation, which draws a distinction between selfishness and self-interest. No association can live and advocate the blotting out from the world the great primal motive of self-interest; on the other hand, every association dies which preaches the doctrine of selfishness.

In the afternoon there was a closed joint meeting of contractors, jobbers and central-station members, the following making addresses: P. Decker, representing the San Francisco contractors; M. L. Scobey, representing the San Francisco dealers; N. Ellis, the Oakland contractors; G. E. Arbogast, the Los Angeles contractors; J. R. Tomlinson, the Oregon contractors; H. L. Tingling, the Washington contractors; S. V. Walton, the central stations, and W. L. Goodwin, the electrical jobbers.

During this session there was made mention of a movement that is on foot for the development of an association of western electrical contractors and dealers representing the entire Pacific slope. A special committee was appointed to confer with the men of the different sections as to ways and means for perfecting such an organization. President Schneider made an address, declining to act as president again after having served three years. A proposition was presented considering the advisability of the Association appointing a field representative, with the idea of educating the men in the electrical industry as to the cost of doing business under the particular conditions which they have to meet and advancing the interests of those so engaged. A. E. Wilcox, of the commercial department of the Great

Western Power Company, talked to the members on electric ranges and methods of selling them; he urged the retailers to talk to the housewives in a way they could understand, avoiding too much technicality.

Early on Saturday a meeting for the consideration of unfinished business and the election of officers was held. The following were elected for the coming year:

President, Frank J. Somers, of San Jose; vice-presidents, northern districts of California, H. C. Reid and M. L. Scobey, San Francisco; M. F. Nagle and J. Gensler, Oakland; M. L. Youdall, Stockton; C. V. Schneider, Sacramento; W. E. Hayes, Santa Rosa.

The secretary-treasurership was left open, this being an appointive office under the direction of the Executive Committee. Then reports were presented, discussed and accepted on the Oakland Section, the Jobbers' Committee, by-laws, and telephone specialties. Delegates from Oregon and southern California also reported at this meeting.

An open meeting was held on Saturday afternoon, C. F. Butte, of San Francisco, acting as chairman. The first address was made by Samuel Kahn, manager of the Western States Gas & Electric Company, who talked on "Central-Station Activities." Among other things, he said: "Groups of us who are assembled here represent separate and distinct interests, and yet we are sufficiently interested to prompt us to consider the welfare of the others in our plan of business life. The aid of one to the other is not based on any tender sentiment, but is rather confined to the modern principles of good business, which demand co-operation for the good of the service, and the greater the co-operation the bigger and better are the rewards. The first step towards co-operation is acquaintanceship, the second is the local organization, and the third is general organization." Speaking of the benefits of organization, he said: "The field of co-operation may be large or limited. Local co-operation for local problems is productive of best results, for each locality has its own peculiar problems and these can best be solved by those within its limits, as they are thoroughly familiar and conversant with the conditions that have to be encountered. In the early development of the electrical business, the central station not only supplied electric energy to the public at large but assumed the role of electrical contractor and dealer also. Perhaps the central station of its own choice did not care to assume this additional role, yet in the eagerness to spread the use of electricity it was found necessary to pursue this policy, as the electrical contractor and dealer of early days lacked the initiative and energy of those of today. We are now confronted with new problems. The closer we study these problems, the greater will be our success."

The second address was by W. L. Goodwin, of San Francisco, whose subject was, "The Development and Growth of Electrical Organization." He gave a history of the development of associations of electrical men, both in the nation and state, particularly the movement started in San Francisco two years ago between the jobbers and contractors, when a proposal was submitted regarding co-operation. This movement has spread all over the United States. Formerly there was a deplorable condition. Many attacks were made on the scheme when first proposed. Organizations formed to fix reasonable prices were also a benefit through their standardization. The Sherman anti-trust law did away with such organizations, although the law was not so intended, but still it worked a hardship. Now we have all the problems that other businesses have to contend with, plus the technical knowledge requisite. The only way to solve these problems is by education along the lines of merchandising, as well as on the technical side.

An address was made by Col. Harris Weinstock, of San Francisco, on "Governmental Co-operation in Association Work." Citing an illustration of the difference between individual and collective effort, he said that formerly, under the old conditions, the individual felt himself self-sufficient, but failed to get anywhere until organization stepped in. The first country to see that organization was the remedy was Germany. After teaching its industries how to produce most effectively, that was only half the problem. They had to organize for developing great markets for their products. Other countries followed this lead and now we see that co-operation is necessary to develop a powerful selling organization. All the advantages of true co-operation apply just as well to the electrical industry.

An address was also made by Russell Lowry, president of the First National Bank of Oakland, on "Trade Acceptances." He said that the closing of commercial transactions by trade acceptances is desirable. The initiative must be taken by such organizations as the California Association. A return to commercial trade paper, many think, would be right. If we are agreed that the result to be obtained would be desirable, then it is time to devise means of meeting the difficulties and bringing about a change in the system.

On July 16, at a meeting in the morning of the Executive Committee, unfinished business was considered and J. W. Redpath, who had worked long and faithfully for the success of the convention, was appointed secretary-treasurer for this year.

A committee of six arranged pleasant entertainment features for the convention. These included a card tournament for the ladies, a roof-garden dinner dansant, automobile rides, and on Saturday evening the annual banquet, followed by dancing on the roof. Short addresses were made and a silver service set was presented to C. V. Schneider, the retiring president, after three years of strenuous service for the Association. On Sunday a boat ride down the river concluded the convention.

New U. S. Mining Record.

Secretary Franklin K. Lane has received from the Geological Survey its mid-year review of mineral production. This official statement covers the first six months of 1916 and includes reports from the federal specialists on the principal product of the mining industry, as well as from the Western offices of the Geological Survey. These summary reports are being made public as authoritative and impartial records of business conditions.

"The mid-year review was so well received last July," said Secretary Lane, "that I believe it met a public need, and it will therefore be continued as one of the services rendered to the public by the Interior Department. The business of the whole country has become so interdependent that facts regarding our mines and mills and furnaces are of real concern to every citizen interested in any industrial undertaking. That the mining industry is making many new records in the extent and success of its business must be taken as an index of the nation's general prosperity. Best of all, 1916 is registering another advance in the growing independence of the United States as a producer of the many materials that civilization has made necessary. Our country is coming into its own."

Waterpower Conference in Tacoma.

On July 11 and 12, delegates from the state of Washington met in a two-day waterpower conference in Tacoma, Wash. Speakers at the meeting included Ralph B. Williamson, of North Yakima; Governor Ernest Lister, of Washington; John H. Lewis, state engineer of Oregon; Prof. O. L. Waller, Washington State College, Pullman, and President Henry Suzzallo, University of Washington, Seattle. A proposed new water rights code to govern the power resources of the state of Washington, which will be presented for passage to the next legislature, was discussed.

Electricity in Cement Manufacturing Plants

A Brief History of Cement, a Description of the Processes Involved in Its Manufacture and a Discussion of Advantages of Electric Motor Drive With Data of Typical Installations

By Arthur C. Hewitt

Industrial Power Series—Article No. 172

PROBABLY the first material used for cementing material was mud, made from ordinary clay and water. It was used by prehistoric man for plastering together stone huts to protect him from the wind and weather. It is more than likely that mud was used for a very great length of time before any better substitute was found and as near as can be ascertained at this time, lime mortar was a second material used for this purpose. But when or where the discovery of lime was made, there are no records that give a definite answer.

Mortar materials may be classified according to their properties, methods of manufacture and materials from which they are made.

(1) Common limes are made by burning relatively pure limestone. When mixed with water they slake and show no hydraulic properties.

(2) Hydraulic limes are made by burning impure limestone at low temperature. They slake with water but show hydraulic properties.

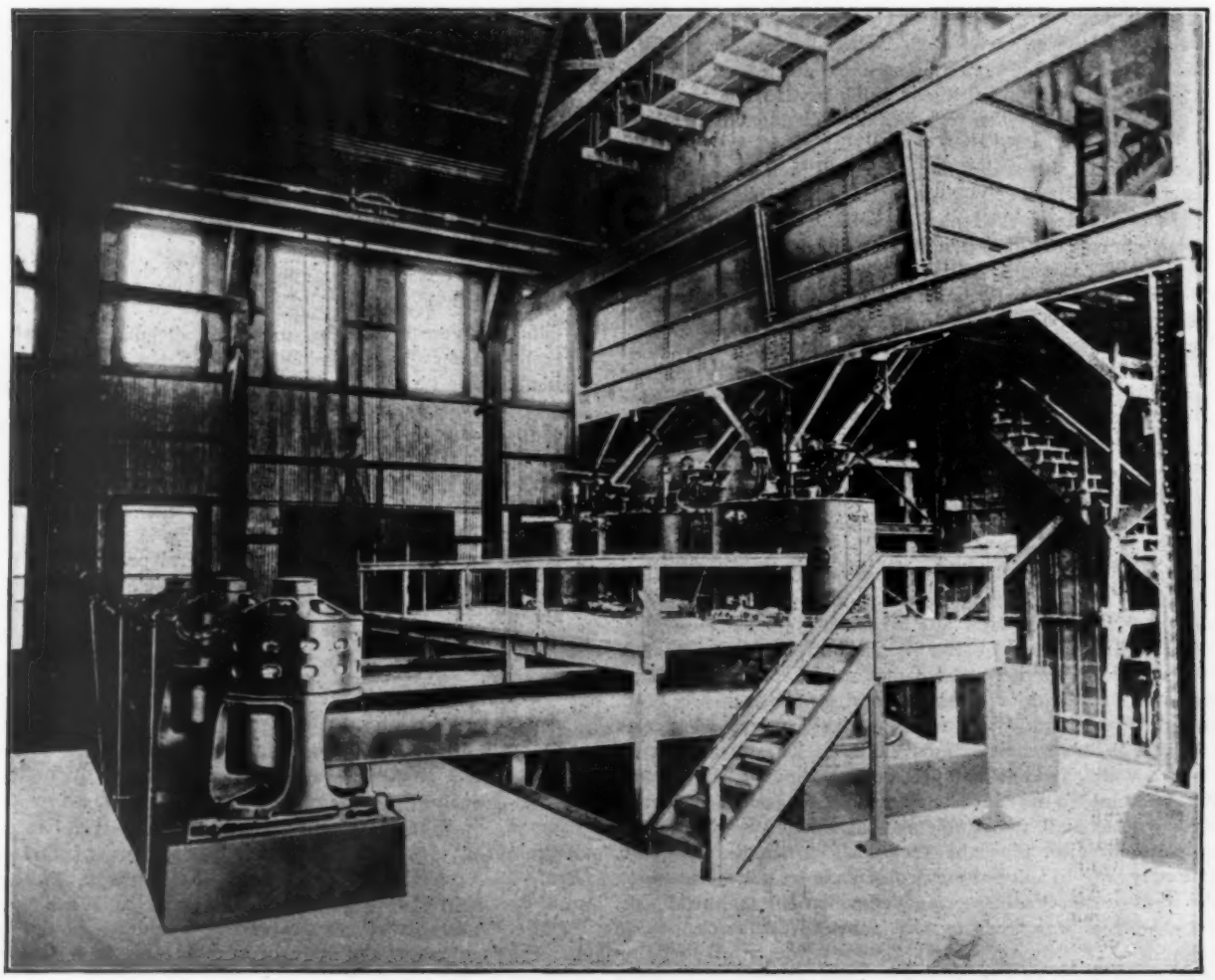
(3) Natural cements are made by burning impure limestones at a temperature insufficient to vitrify them. They do not slake with water, but require pulverizing in order to convert them into a hydraulic cement.

(4) Portland cement is made by burning to incipient vitrification an intimate mixture of an argillaceous material, such as clay or shale, and a calcareous material, such as limestone or marl, in which mixture the percentage of silica, alumina and iron oxide bears to the percentage of lime the ratio of about 1 to 2, which vitrified product does not slake with water, but, upon pulverizing, forms an energetic hydraulic cement.

(5) Puzzolan cements are made by incorporating slaked lime with fine pulverized slag or ash or by mixing a small proportion of Portland cement clinker with suitably treated slag and pulverizing the mixture.

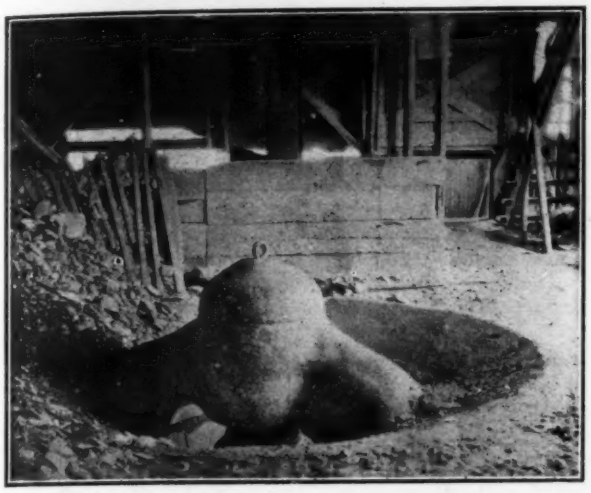
(6) Plasters are made by heating gypsum sufficiently to drive off from three-fourths to all of the combined water which it contains and pulverizing finely the more or less dehydrated residue.

John Smeaton, an English engineer, who had been em-



Vertical Motors Driving Fuller-Lehigh Pulverizing Mills.

ployed by Parliament to build a lighthouse on a group of rocks in the English Cannel, made some researches which marked the beginning of the cement industry. The rocks in the channel were what are known as gneiss rocks. This



Top of a No. 7½ Gyratory Crusher.

particular place is called Eddystone, and at high tide the rocks were under water for some hours and many shipwrecks had occurred upon them. Two wooden structures built upon them had been subjected to the storms and each had experienced a short life. When Smeaton attempted the problem he determined to build a structure which would not be blown down in the storms. One of the greatest troubles he had to overcome was the failure of ordinary lime mortar to harden under water. In order that the foundation should be solid, it was necessary that some mortar be found which would meet this difficulty. In 1756 he undertook a series of investigations which resulted in the discovery that the white, hard, pure limestones, hitherto considered best for lime making, were in reality inferior to the soft clayey ones, because from these latter he succeeded in making a lime far superior to any then in use because it not only hardened better in air, but also hardened under water.

He found such a limestone in Cornwall and the hydraulic lime formed by burning this stone was the basis of the mortar used in the construction of the Eddystone lighthouse. In making this lime he used only the layers of his quarry, which, after burning, produced a product that would slake with water. The idea of burning the layers which did not slake readily, and then by grinding convert them into a very energetic hydraulic lime, did not suggest itself to him and it was not until about 40 years later that this improvement was made in the manufacture of hydraulic lime.

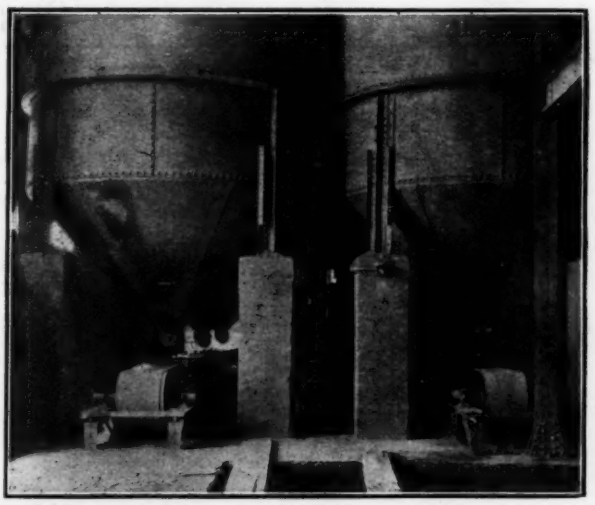
A man named Joseph Parker, of North Fleet, England, in 1796 took out a patent covering the manufacture of hydraulic lime which he gave the name Roman cement. He made this Roman cement by burning pieces of clay, called septaria, and then grinding the resulting product to a fine powder. This clay used by Parker is very similar to what is known in this country as Rosendale cement rock. This cement rapidly became a favorite with English engineers because so much could be done with it that was impossible with quicklime. In 1802 this cement was manufactured in France and soon became very popular there.

The invention of Portland cement is generally credited to Joseph Aspdin, a bricklayer, of Leeds, England, who in 1824 took out a patent on an improved cement which he made from the dust from roads repaired with limestone or else from limestone itself, combined with clay, by burning and grinding. He gave this the name of Portland cement because its color resembled the appearance of the stones taken from the famous quarry of Portland. One of the first great pieces of work where Portland cement was used is the tunnel under the Thames River, which was built in 1828. It was not until 1852 that the Germans began the manufacture of Portland cement. They were quick, however, to see the value of the new building material, and with care and study they soon turned out a product which was superior to that made in England. They did this by substitution of scientific methods rather than by the rules of thumb. Ths Germans were probably the first to appreciate the value of fine grinding of cement and until recently German Portland cement was considered standard. Today, however, there is no better Portland cement made anywhere than is made in the United States. Probably the first cement manufactured in this country was made in 1818 by a man named White, in Madison County, N. Y. The cement manufactured by him was used in large quantities in the construction of the Erie Canal and was purchased for a price of about 20 cents per bushel. It was not long after this that a cement mill was built at Rosendale, N. Y. This soon became the center of the cement industry in this country. In 1829 cement rock was discovered near Louisville, Ky., while constructing the Louisville & Portland Canal, and almost immediately a mill was put in operation there. Cement mills began to spring up all over the country after that and the eastern portion of Pennsylvania, which is now known as the Lehigh district, soon became the greatest center for the manufacture of cement in this country.

Process of Manufacture

The process of manufacturing Portland cement can be stated simply in a few words. It consists of grinding the rock to a fine powder, burning it in a kiln and then regrinding the resultant clinker. This all sounds very easy when stated in so few words, but in reality the process is a very complicated one.

There are some rocks from which Portland cement can be made without the addition of any other substances. However, cement rock, as it is commonly called, is not found in many localities in this country, and the most com-



Type of Storage Bins Used for Raw Materials in a Cement Plant.

mon materials used are limestone and clay or shale. Portland cement may be manufactured, however, from a variety of raw materials.

There are two processes of manufacture in common use, one being known as the wet process and the other as the dry process. However, in each process the materials are handled in exactly the same way from the time they are placed in the kiln until they reach the state of finished

product. In the wet process, the raw materials are handled in a liquid condition, while in the dry process they are dried before being pulverized. The condition of the raw materials as they are taken from the earth is usually the determining factor as to whether the process to be used will be wet or dry. Under most conditions it is by far the cheaper to use the dry process on account of the less fuel required to reduce the raw materials to the clinker, the difference in favor of the dry process being approximately 500,000 British thermal units per barrel of cement.

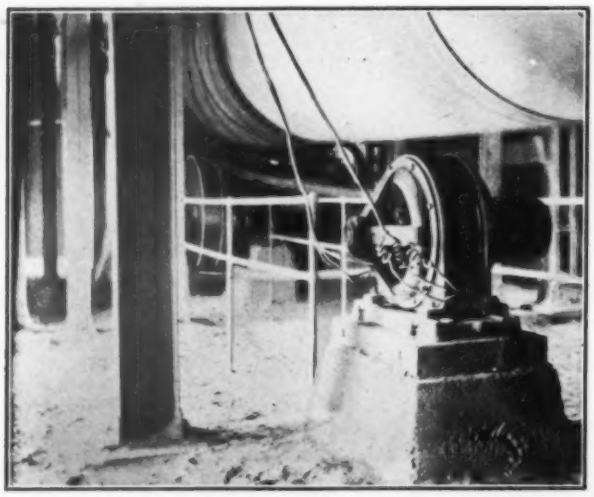
By far the greater number of cement plants in this country use the dry process and the stone is either mined or quarried. It is loaded into cars at the mine or quarry either by hand labor or steam or electrically driven shovels, and is then transported to the crushing plant.

For drilling blast holes in the rock there are several kinds of drills used, the most common being the ordinary well drill, which is usually driven by a small steam engine and boiler, all mounted on wheels, and the tripod drill, which is driven by compressed air or steam. Electric drills have been used to some extent but in most cases have proven unsatisfactory because of too small a motor being used. There is a drill on the market at the present time which includes a small motor-driven air compressor and a tripod drill very similar to the ordinary drill, which, the writer understands, has given very satisfactory service, but on account of its weight does not lend itself readily to the bench method of quarrying. Small drills, known as jack hammers, are used in almost every case for breaking up the larger stones which are blasted down. Many operators claim that the well drill offers the most economical method for this purpose. However, the experience of the company with which the writer is connected has been opposed to this. Probably on account of special conditions at its quarries it has used the tripod drill almost entirely.

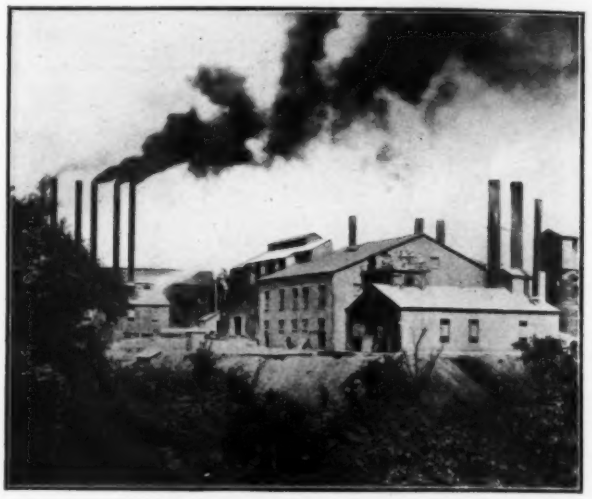
Dry Process.

The following discussion will be entirely upon the dry process and no attempt will be made to discuss the advantages or disadvantages of the wet process.

The method of conveying the material from the quarry to the crusher depends upon the characteristics of each location, some of the factors being distance, difference in elevations between quarry and crusher, labor conditions and cost of equipment. Where steam shovels are used for loading cars and the difference in elevation between quarry and crusher is slight, locomotives are very commonly used for this purpose. At some plants the quarry is so located that mule teams can pull quite heavy cars and other plants are so situated that the material can be delivered by gravity-operated balanced cableway. There are a few cement plants in this country which are situated on the sides of steep hills or mountains and the raw material is mined at a considerable elevation above the plant. There is one plant in West Virginia which has almost ideal conditions for conveying throughout the entire plant on account of its being located on the side of the mountain, the routing of the material through the plant being so arranged that very few elevators are needed; in fact, there are only four in the entire plant.



25-Horsepower Induction Motor Driving 8-by-125-Foot Kiln.



A Cement Plant in Maryland.

Crushing Processes.

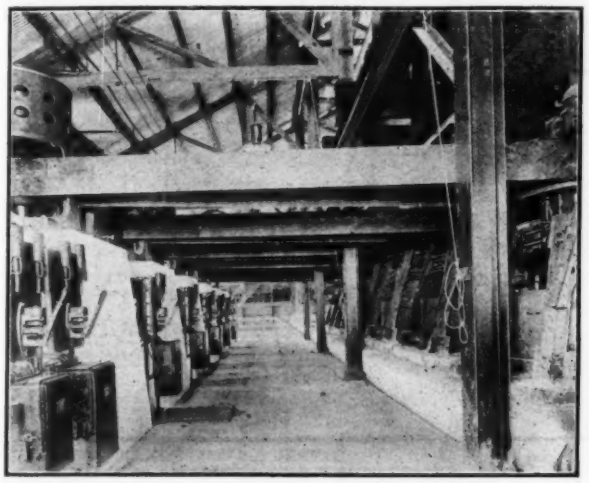
There are various types of crushers in use for the preliminary crushing of the stone, the most commonly used one being the gyratory crusher. This consists of a hopper-shaped receptacle lined with chilled cast-iron plates, in the center of which swings a large chilled cast-iron head which has the shape of a frustum of a cone, the cast-iron head being operated by an eccentric in the lower end, the top end being a fixed bearing. Another very common type of crusher with its many variations is known as the roll crusher. Some of these consist of one roll with projecting spikes which revolves very close to a fixed casting and crushes the material between the roll and the casting. Another type of roll crusher consists of two rolls running at the same speed at variable distances apart. The writer understands that the Edison Portland cement plant is equipped with the two-roll crusher of various sizes for all operations for crushing and grinding throughout the plant. Even the pulverizing is done by the rolls.

From the preliminary crusher the stone usually passes through a secondary crusher, which may or may not be of a similar type as the preliminary. At many plants the secondary crusher consists of a hammer mill. The hammer mill as ordinarily constructed consists of several rows of pivoted iron bars which revolve at high speed, the material being fed in at the top and as it is hammered and sheared it works around the rotor and out through a screen at the bottom. It is possible to vary the fineness of the discharge from these hammer mills by setting the fixed plates at varying distances from the rotor; the closer the fixed plate is set, the finer the product, and vice versa, with a given screen.

In most plants the stone is dried after being run through the secondary crusher and at this stage in the game all of the material is of such fineness that it will entirely pass through a 1.25-inch ring. The determining factor as to whether the stone shall be dried before or after crushing is the amount of clay or mud contained in it, for it is

plainly evident that if there is much mud in the stone as it comes from the quarry it cannot be dried thoroughly before being crushed. If this were attempted the balls of mud would only be superficially dried and would contain a core of wet mud which would clog up the screens in the pulverizing mills further on in the process. The most common type of dryer consists simply in an inclined rotating cylinder, usually about 5 feet by 50 feet. The stone is fed in at the upper end and a small furnace is fired at the lower end so that the stone and hot gases travel through the dryer in opposite directions.

Most plants find it necessary to use shale or clay in addition to the limestone or cement rock and often the shale or clay has to be transported by rail several miles to the plant. The shale, upon being received at the plant, passes through a similar process as does the stone up to the drying. At this point they are usually mixed together in the proper proportions. A very common type of mixer is a cylinder similar to the dryers except that projecting plates are riveted to its inner surface. From the mixer the material is conveyed to tanks located just above the pulverizing machines. There are many types of pulverizers used



75-Horsepower Vertical Motors Driving Giant Griffin Mills.

for reducing the mixture to a fine powder. This machinery may be classified under three heads: Mills with interior screens, mills with exterior screens, and screenless mills.

After the materials are pulverized so that from 80 to 85 per cent will pass through a 200-mesh screen, it is then conveyed to storage bins immediately next to the kilns. A new factor which has recently been introduced at this stage is rapidly gaining favor among cement-mill operators. It is known as the "silo system." This silo system merely requires an extra set of storage tanks for receiving the pulverized material so that the material can be re-mixed before going to the kilns. This allows the chemist to have better control of the composition of raw materials.

The pulverized raw material is fed at an even rate of speed into the upper end of large rotary kilns. These kilns consist of a steel cylinder, inclined approximately five-eighth-inch to the foot, and revolve from one-half to two revolutions per minute. They are usually fired with pulverized coal. However, fuel oil and gas have been used, but at the present time there are not more than two plants in the United States using gas. The pulverized coal is blown in by means of compressed air and it burns with a long flame very much similar to a gas flame. The earliest kilns of this type, some of which are still being used in this country, measure 5 by 60 feet, outside measurements. The largest kilns known to the writer at this time are 10 by 260 feet. The most common size kiln is 8 by 125 feet. The steel shell is lined with from 9 to 18 inches of fire brick on its inner surface. Some of the linings have been found to stay in continual service as long as 18 months, with the exception of the zone where the flame impinges on the side. It is necessary to reline or repair the lining of the hot zone very frequently, and in some plants and with certain kinds of fire brick this has been done as often as once a month.

The fuel consumption per barrel of cement will vary in American practice from 80 to 150 pounds per barrel. Good practice shows that with ordinary conditions it can be done with 95 pounds per barrel in most plants, the coal containing from 8 to 12 per cent ash and 35 to 40 per cent volatile matter. The temperature reached in the kiln will approximate 3,000 degrees Fahrenheit, and the temperature of stack gases ranging between 500 and 1,000 degrees.

The process of pulverizing coal for use in cement kilns is an art by itself and is one that has been very widely discussed in engineering circles within the past two years. However, suffice it to say that the coal is handled in much the same way as the stone, in that it is crushed, dried and pulverized with the same types of machinery.

As the material passes through the kilns, carbon dioxide is driven off from the calcium-magnesium carbonates and the mixture reaches a temperature at which incipient vitrifaction takes place. The operator of the kiln usually has control of the burning by varying the speed of kiln rotation and quantity of coal fired, and he watches the burning process through dark blue glasses and determines his variations by what he sees inside. As the material rolls through the fire zone it balls up into clinker, ranging in size from dust to about two inches in diameter. A good operator can control this size to a certain extent in the burning process. However, the chemical constituents of the raw material influences this factor to a great extent.

The clinker falls from the lower end of the kiln in a red to white-hot condition and is conveyed either through rotating coolers or direct to a large storage yard, where it is allowed to cool and age. At some plants streams of cold water are thrown on the hot clinker to speed up the cooling. This water in no way affects the cementing qualities of the finished product. From the storage yard the clinker is usually picked up with a grab bucket attached to a traveling crane and dumped into hoppers, where it can be drawn upon and delivered to the finishing mill.

The clinker is weighed usually with automatic hopper scale and gypsum (calcium sulphate) is added up to a maximum of three per cent by weight. This gypsum is added for the sole purpose of controlling the setting time of the finished cement. Increasing the amount of gypsum reduces the setting time, and vice versa.

After the addition of the gypsum the clinker goes through a grinding process which, in many mills, is an exact duplicate of the raw grinding. However, the grinding of the clinker is watched with extreme care to prevent particles of coarse material getting into the finished cement. Samples of the cement coming from these grinding mills, except where tube mills are used, are usually taken about once every hour. There is very little chance of coarse particles being discharged from the tube mills and for this reason it is not so necessary to keep a check on the fineness of its product. The material discharged from these grinding mills is the finished product of Portland cement and is usually conveyed to large stock houses, which are divided into bins. The bins are usually filled one at a time and sealed. and before shipments are made from these bins their contents are sampled and tested by the plant chemist and must remain in the bins until the completion of his test. There is some question about the effect of allowing the finished cement to age before it is used, but most cement mills do not consider this factor, as no conclusive arguments have been produced on either side of the

question. After the chemist tests the materials in these bins and advises that it is satisfactory, the cement is then taken to the packing houses, where it is either packed in bags or barrels or conveyed direct to cars for bulk shipments. At the present time very little cement is shipped in this country in bulk, but it is by far the most economical method where the quantity used will permit it. There is a growing tendency in this direction. The cost of handling and packing bags is very large in comparison to the cost of the cement. Some cement plants have their packing done by contract, the contractor owning and operating the packing machines. Some packing machines weigh the bags automatically as they are filled, while in some cases it is necessary to weigh the bags after they leave the machines.

It can be seen from the foregoing discussion that the process of making Portland cement is largely one of pulverizing and conveying and the problems presented in planning the conveying and elevating systems are often very difficult of solution. There are many kinds of conveyors used throughout the plant, the most common being bucket, belt, screw, and chain.

Under standard specifications, there is very little difference between the various brands of Portland cement as manufactured in this country at the present time. The main differences are color, setting time, and rate of gain in strength. For outside surface of buildings, color is a very essential factor and it is well to know something about the color of a given brand of cement before using it for this purpose.

Power Consumption.

The cement plants of today are very heavy users of power. The average consumption for every barrel of cement is approximately 18 horsepower-hours. This figure will vary between the limits of 16 and 25. The location and arrangement of the plant with respect to the location of raw materials will govern this to a great extent. If it is possible to use gravity throughout a good portion of the plant instead of having to use power to elevate the material, the power consumption will be very low.

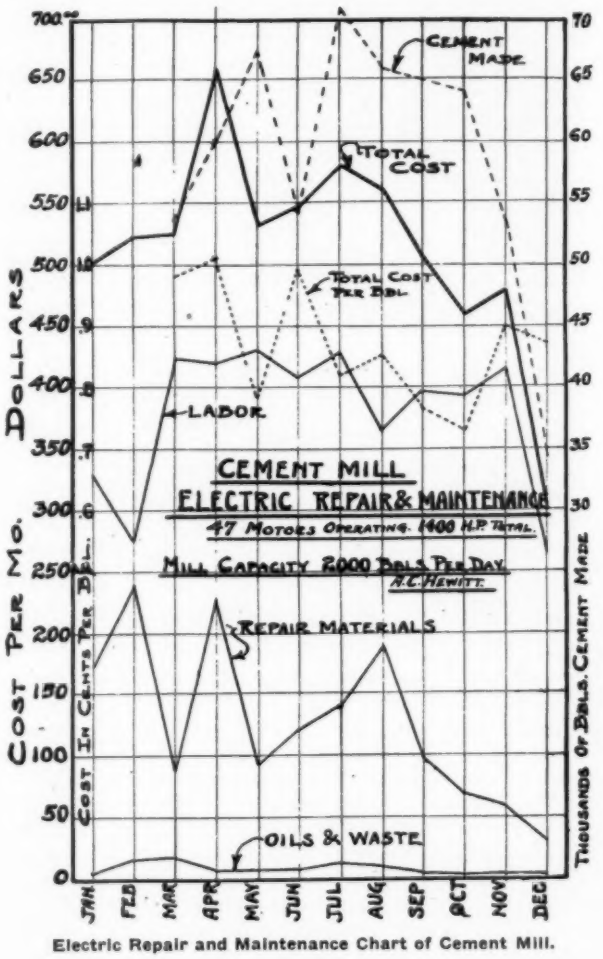
As most plants use electric power, it necessitates the employment of several electricians to look after the electrical equipment. To get any life at all from motor bearings, it is absolutely necessary that each bearing be made dustproof. This is usually done by a felt ring with a sheet-iron washer to hold it in place. With a plant of about 2,000 barrels per day capacity there would be approximately 2,800 horsepower of motors installed. It is customary to use individual motors for each machine as this usually works out to give continuity of operation. In equipping a plant with motors it is very important to standardize on one particular type of motor and use as few different sizes as possible.

The slow-speed motors have proven much more satisfactory than high-speed motors, mainly for the reason that they are built more ruggedly. The voltages most frequently met with in cement-mill service are 220-volt direct current and 440 to 550-volt alternating current. There are a few plants equipped with 2,300 volts, but on account of cement dust collecting on insulators and breaking down the insulation on the wires, this has proven to give a great deal of trouble. Five hundred and fifty volts will probably prove the most economical of any for this purpose.

By-Products of Cement Plants.

The war in Europe has been the means of calling attention to a very important by-product of the cement plant, namely, potash.

Nearly all raw materials used for making Portland cement contain more or less potash; some run as high as 1.5 per cent of soluble potash salts (K_2O). The average raw materials will run between 0.5 and 0.75 of one per cent. A good part of this potash is driven off in the burning process, and by using the Cottrell process it is possible to collect about 98 per cent of the part that is driven off. At the present time there is only one cement plant in this country that is operating a Cottrell electric precipitation plant for the recovery of potash. That plant is located in California, and the peculiar thing about this installation is that the company was compelled by court to install apparatus to put a stop to the dust nuisance and the Cottrell plant was put in solely for that purpose. It was not until after the war began that the dust so collected was sold for its potash content. There are several cement plants that are now installing the Cottrell process solely for the collection of potash; one of these new plants will probably start operation soon and another one will be ready to operate in the fall. If it were not so difficult to get



Electric Repair and Maintenance Chart of Cement Mill.

materials for their construction these plants would have been in operation before now.

In the Cottrell process, as it is used in the cement plants, an apparatus is arranged so that the gas from the cement kiln stacks, which is laden with dust, is passed through large iron tubes which form one side of a high-tension direct-current electric field, and through the center of which is supported an electrode of the opposite polarity. The voltage used for this purpose ranges from 35,000 volts to about 80,000 volts, and is obtained from an alternating-current source and rectified by a mechanical rectifier. The intense static electric field set up in the iron tubes causes the dust particles to adhere to the sides of the tubes until shaken loose by an operator about once an hour. The dust so collected is very valuable at the present time as there are many chemical industries that must have potash and the supply which originally came from Germany has been cut off.

Cement Manufacture—Plant "A."

Capacity, 2,000 barrels per day. 180 men employed, including quarry and power house.
Connected load, 2,638¾ horsepower. 440-volt, 3-phase, 60-cycle power.
Average per year, 18 kilowatt-hours per barrel of cement made.

Motors.

No.	Horse-power.	Speed, R. P. M.	Application.
			Rock Crushing and Drying Department.
1	100	600	One No. 7½ gyratory crusher; one 30-foot elevator; one 30-foot belt conveyor; one hoisting drum for car haul.
1	150	600	One 40-foot belt conveyor; one No. W7 Pennsylvania hammer mill; one 30-foot elevator; two 5-foot by 50-foot rotary dryers.
1	10	900	One 40-foot elevator.
1	30	720	One 12-inch by 60-foot screw conveyor.
1	20	900	Two 18-inch by 40-foot belt conveyors.
			Shale Crushing and Drying.
1	75	600	One 24-inch by 36-inch Jeffry hammer mill.
1	10	900	One 18-inch by 130-foot belt conveyor; one 5-foot by 50-foot rotary dryer; one 12-inch by 30-foot screw conveyor.
1	10	720	Two 30-foot elevators.
			Raw Mill.
1	400	90	Buckeye steam engine (rope drive to main shaft); six Giant Griffin mills; one 6-foot by 50-foot rotary cylinder mixer; one 40-foot elevator; one 12-inch by 50-foot screw conveyor; one 12-inch by 70-foot screw conveyor.
1	300	90	Buckeye engine (belt drive); two Giant Griffin mills. Also two 100-kilowatt generators.
2	100	720	Each belted to two 33-inch Fuller Lehigh mills.
			Kiln Room.
1	10	720	One 40-foot elevator. One 12-inch by 60-foot screw conveyor.
2	25	720	Variable-speed (wound-rotor) type motors, one belted to one 6-foot by 100-foot rotary kiln; one belted to one 8-foot by 125-foot rotary kiln.
1	50	900	One No. 8 Sturtevant blower (1,700 revolutions per minute.)
2	10	720	Each driving one 40-foot elevator and two 6-inch by 3-foot screw feed for pulverized coal.
			Coal Grinding.
1	125	600	Belted to line shaft driving one 18-inch by 50-foot belt conveyor; one coal dryer; three 33-inch Fuller-Lehigh mills; two 40-foot elevators; 125 feet of 12-inch screw conveyors.
			Clinker Storage Yard.
1			Locomotive crane with ⅓-yard clam-shell bucket.
1	15	720	One 18-inch by 150-foot apron conveyor.
1	15	720	One 40-foot elevator.
			Finishing Mill.
1	50	720	One 18-inch by 24-inch Buchanan roll crusher; one 18-inch by 50-foot belt conveyor; one 20-foot elevator; one 40-foot elevator.
1	15	720	One 18-inch by 50-foot belt conveyor.
1	400	90	Buckeye engine, rope drive to line shaft; one Schmidt comminutor mill; three Giant Griffin mills; two 6-foot by 17-foot tube mills; one 12-inch by 100-foot screw conveyor.
1	60	720	One Schmidt comminutor mill.
3	75	400	Three Giant Griffin mills.
1	20	720	One 30-foot elevator; two 12-inch by 20-foot screw conveyors.
			Cement Stock Houses.
1	20	720	One 40-foot elevator; one 12-inch by 200-foot screw conveyor.
1	10	900	One 18-inch by 150-foot belt conveyor.
			Packing House.
1	40	720	Two 12-inch by 200-foot screw conveyors; two 12-inch by 30-foot screw conveyors; one 30-foot elevator.
1	30	720	One 12-inch by 80-foot screw conveyor; one 30-foot elevator; one four-spout Bates bag-packing machine.
1	10	720	Two four-spout Bates bag-packing machines.
			Bag Cleaning, Repairing and Storage.
1	10	900	One rotary bag-shaking and cleaning machine; one 18-inch by 10-foot belt conveyor.
1	1	1,800	Two sewing machines.
1	5	1,200	One 30-foot bag elevator; one 24-inch by 40-foot belt conveyor.

Cement Manufacture—Plant "A."—Continued.

Miscellaneous.

1	10	720	Machine shop line shaft, driving one 14-inch by 8-foot lathe, two small drill presses, one cold-metal saw and one bolt-threading machine.
1	10	720	Two 4-inch by 6-inch Triplex pumps.
1	3	1,200	One 3-inch by 3-inch Triplex pump.
1	1.5	1,800	One laboratory vacuum pump; one sample crusher.
1	0.25	1,800	Sieve shaker.

Cement Manufacture—Plant "B."

Capacity, 2,000 barrels per day. 200 men employed.
Connected load, 2,402 horsepower. 550-volt, 60-cycle, 3-phase power.
Load factor, 60 per cent. Average, 28 kilowatt-hours per barrel of cement.

	Kilowatt-Hours.	Barrels Clinkers Burned.	Barrels Cement Made.
January	278,000	12,170	10,080
February	502,000	27,830	15,590
March	964,000	43,310	29,770
April	703,000	21,150	30,800
May	779,000	21,640	35,780
June	813,000	26,380	37,610
July	1,321,000	38,800	67,830
August	831,000	23,290	34,330
September	720,000	24,480	25,220
October	1,113,000	46,150	45,760
November	Shut down		
December	Shut down		

Motors.

No.	Horse-power.	Speed, R. P. M.	Application.
			Quarry.
1	75	900	Air compressor.
1	30	1,200	Hoisting drum for car haul.
			Clay Drying and Grinding.
1	20	1,200	Belted to 30-foot of line shafting, driving one 6-foot by 45-foot rotary dryer; one 45-foot elevator; one set 24-inch by 24-inch crushing rolls.
1	50	900	Belted to 5-foot shaft and 25-foot line shaft, driving three 35-foot bucket elevators; two 10-inch by 40-foot screw conveyors; one 10-inch by 110-foot screw conveyor; two Newago screens.
			Rock Drying and Grinding.
1	50	900	One No. 6 gyratory crusher; one 65-foot elevator.
1	30	1,200	Belted to two 12-foot countershafts, driving one 6-foot by 45-foot rotary dryer; one 35-foot elevator; one 24-inch by 50-foot pan conveyor.
1	50	900	Williams pulverizer.
2	75	900	Each driving a ball mill 8-foot diameter at 22 revolutions per minute.
1	200	600	Six-foot 6-inch by 20-foot tube mill at 24 revolutions per minute.
1	150	600	Six-foot 6-inch by 20-foot tube mill at 24 revolutions per minute.
1	125	600	Six-foot 6-inch by 20-foot tube mill at 24 revolutions per minute.
1	15	600	Belted to countershaft, driving one 10-inch by 100-foot screw conveyor; one 75-foot elevator; one 10-inch by 50-foot screw conveyor.
			Kiln Room.
1	20	900	One 8-foot by 120-foot rotary kiln; one 10-inch by 20-foot screw conveyor.
1	50	900	Belted to 50-foot countershaft, driving two 8-foot by 120-foot rotary kilns; two 10-inch by 20-foot screw conveyors; two 35-foot elevators.
1	75	900	Roots No. 6½ postitive blower at 170 revolutions per minute.
			Finishing Mill.
1	30	900	Belted to 50-foot countershaft, driving three Newago screens; one 10-inch by 30-foot screw conveyor.
3	75	900	Each driving a Sturtevant ring roll mill.
4	100	600	Each driving a 6-foot by 20-foot tube mill at 24 revolutions per minute.
1	125	600	Each driving a 6-foot by 20-foot tube mill at 24 revolutions per minute.
1	150	600	Each driving a 6-foot by 20-foot tube mill at 24 revolutions per minute.
1	10	1,200	Hopper type grinder for gypsum.
1	20	900	Twenty-five-foot elevator.
1	20	1,200	Newago screen.
1	20	900	Thirty-five-foot elevator.
1	30	1,200	Three hundred feet of 12-inch screw conveyor.
1	15	1,200	One 45-foot elevator; one 12-inch by 50-foot screw conveyor.
1	50	900	One hundred and eighty feet of 12-inch screw conveyors; one 42-foot elevator.
			Packing Department.
1	15	1,200	Bates bag-packing machine.
1	20	1,200	Bates bag-packing machine.
1	2	1,700	National bag-packing machine.
			Miscellaneous.
1	10	600	Oil pump.
1	20	1,200	Machine shop.

COMMERCIAL PRACTICE

New-Business Methods, Policies, Rates and Kindred Central-Station Matters for the Man Engaged in Selling Electricity

ELECTRIC COOKING PROGRESS.

Seventeen Reasons Why Ranges Are Being Sold by Texas Power & Light Company.

Further evidence that electric cooking is making good in the South is shown by the accompanying illustrations. Many ranges have been placed in Texas by the Texas Power & Light Company during the past eight months and the demand is just now at its maximum. As stated in previous issues, no attempt has been made in this section to campaign for range installations, but the work has been conducted more along the line of exploitation and introduction.

It is interesting to note that in a few cases negro servants are using electric ranges with marked success. This is a problem which at first thought would appear a difficult one, but the fact of the matter is that few of the people who are buying electric ranges have servants. Most of the people buying ranges are people who are doing their own work. On this account the company has found quite an active demand for a lower priced range and has made arrangements to supply this demand. One of the accompanying illustrations of special interest is the one showing the school girls learning the "electric way." Domestic science installations are not only good revenue producers, but the good educational work they do among the coming generation can hardly be estimated. Another installation, much larger than that shown in the illustration, has been contracted for recently.

H. H. Russell, of the General Electric Company, who has been conducting the work for the Texas Power & Light Company, says the following are some of the reasons why electric cooking is making good:

(1) Safe—The elimination of matches and the fact that there is no flame which means absolute protection from the hazard of fire. No danger of explosions.

(2) Clean—No blackened walls, dirt, soot or smoke.

Electric Range Starting on a 30-Mile Trip to an Anxious Customer.

Also electric ranges are easy to clean because no dirt is caused by fuel.

(3) Sanitary—Since there is no flame in an electric stove, there is no combustion and consequently no possibility of poisonous fumes escaping to contaminate the atmosphere and the food which is kept in the kitchen or pantry. The air in the kitchen will remain so pure that even delicate flowers may be kept near the range without fear of withering. Such ideal atmospheric conditions are as beneficial to human health as to that of plant life.

(4) Regulation—The electric stove has perfect regulation. A quarter turn of the switch starts the fire at a maximum heat; another quarter turn of the switch gives medium heat; another quarter turn gives low heat. It can be controlled in such a way that there is an even temper-

A Domestic Science School at Taylor, Tex., Equipped with Electrical Equipment.

Uncrating a Shipment of Ranges Preliminary to Installation.

ature at all times for the many different kinds of foods to be cooked.

(5) Certainty—The absence of uncertainty as to results to be obtained. A poor cook will cook better food on an electric range and a good cook will do her best with electricity.

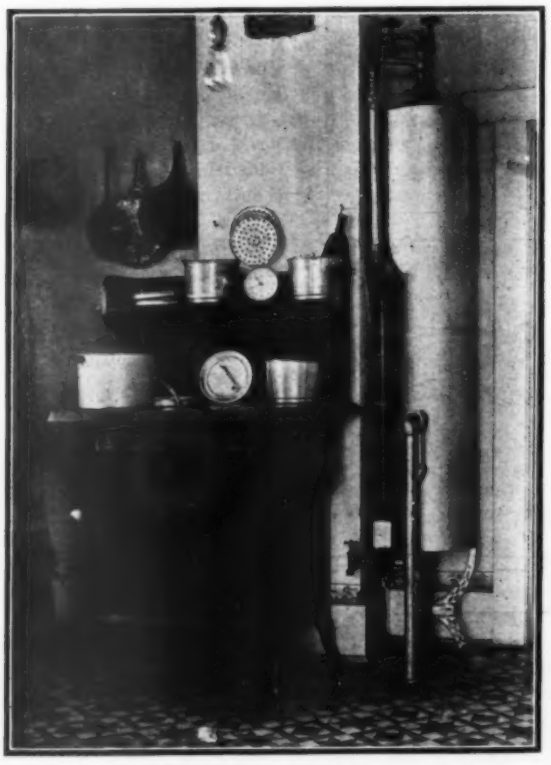
(6) Economy—Economy in food value otherwise wasted by shrinkage and additional nutriment retained in all food cooked. There being no flame, there is no extraction of juices that should remain in the food, those juices as a rule being the best portion and most vital parts of the food.

(7) Cool—Concentration of heat where it is needed. No unnecessary heat in the kitchen. The electric stove is especially desirable in warm summer months, there being no radiation of heat in the room.

(8) Bright—Bright utensils, no dirty, smoky pots or pans to be constantly cleaned.

(9) Perfect—The perfection of baking is done by means of the electric oven, all guesswork as to temperature being eliminated. The perfection of broiling is the electric broiler, no fumes or gases to contaminate the food which is cooking so close to the heat and no smoke from spattering grease catching fire from the flame.

(10) Saving—Saving in shrinkage of food means saving of money. Time is saved in cleaning up the range and cleaning the utensils; health is saved, due to better nutrition of electrically cooked foods and the living and working in a better atmosphere.



Electric Range and Water-Heater Installation.

(11) Controlled—Cooking becomes an exact science. No uncertainty and no failure, the cooking being controlled by regulation and not by guess.

(12) Appetizing—Meals are more savory, more digestible and altogether better.

(13) Efficient—Efficient and quick in operation. Heat is instantly available and readily regulated.

(14) Conserved Heat—Oven retains baking temperature long after current is turned off.

(15) Dainty—Kitchen clothes no longer a necessity because kitchen duties become light and the work clean.

(16) Progressive—Adds dignity to the housework and keeps in step with the march of progress.

Costs of Operating Domestic Appliances.

The appliance department of the Philadelphia (Pa.) Electric Company estimates the cost of operating electrical appliances used in the household as follows, based on its seven-cent secondary rate, on the same circuit with house lighting. The company's primary rate is nine cents, which covers the first 12 kilowatt-hours per month, and there is a tertiary rate of five cents, which is for all energy in excess of 87 kilowatt-hours per month.

Reckoning the lighting of an average family at $1.08 per month, the use of appliances comes on the secondary rate, while a more liberal use brings the five-cent rate into effect for all customers whose bill is $6.33 per month or more.

Appliance	Cost per Hour to Operate at 7 Cents per Kilowatt-hour, Cents
Electric washer	1.4
Vacuum cleaner	0.9
Iron	3.9
Toaster	3.2
Fan	0.4
Heating pad	0.4
Milk-bottle warmer	3.5
Percolator	2.7
Sewing machine motor	0.4
Grill	4.2
Chafing dish	3.5

With these figures as a basis, the average cost of washing, ironing, sweeping, sewing, etc., for a family of six persons amounts to the following:

OPERATION.

	Cents
Washing, once a week, 2 hours' use of current	2.8
Ironing, 4 hours' use of current	15.6
Sweeping, thrice weekly, 2 hours' use of current	1.8
Sewing, 3 hours a week	1.2
Total	21.4

The following estimated cost is found for a breakfast electrically prepared for six persons:

	Cents
Broiled chops, saute potatoes (grill) (Both cooked at same time, 15 minutes.)	1.05
Coffee (percolator), 15 minutes	0.6
Toast (electric toaster), 10 minutes	0.6
Total	2.15

The above figures are averaged from the performances of the best and most reliable appliances. For example, the average consumption of a bag-type sweeper is 125 watts. Figured at 7 cents gives 0.875 cents per hour, average cost.

The company points to the great hygienic advantages which are obtained from the electric operation of the various household functions, this feature supplementing the economy resulting from the use of electrical energy. A separate circuit is not needed for a low rate.

Flatiron Campaign in Lexington.

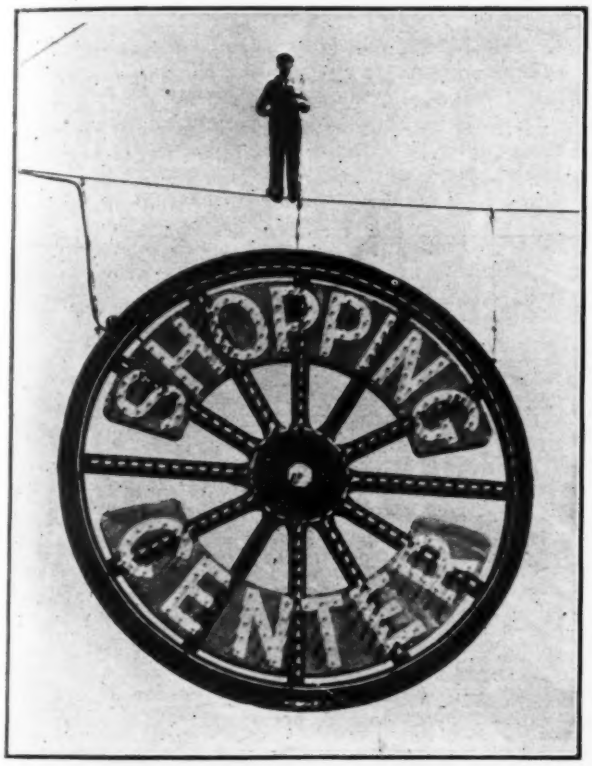
The Lexington (Ky.) Utilities Company is making a 30-day offer of an electric flat iron, selling regularly for $3.50, and a $2.50 folding ironing board, for the price of the iron. The offer is meeting with a large demand.

TRADE FOLLOWS THE LIGHT.

New Community Sign in Salt Lake Proves Truth of Slogan.

A large animated electric sign has been suspended over the intersection of Broadway and State Streets, Salt Lake City, Utah, by the State Street Improvement Association and the Broadway Improvement Association. Passers-by who come within the sphere of influence of this sign by day, and especially by night, are forcibly reminded that this intersection is the shopping center of Salt Lake City.

An immense wheel, suspended 65 feet above the street, atractively painted in brilliant colors and illuminated by 10-watt Mazda lamps, is so conspicuous that few can escape seeing it. It is claimed that this is the largest sign over a street intersection in America, and it undoubtedly presented the most difficult problems in erection, owing to the great width of the Salt Lake City streets, which are eight rods in width between property lines. The sign is 19 feet in diameter and weighs approximately 1,200 pounds. The sign is in the form of a drive wheel with the hub featured, indicating that this intersection is the hub of the shopping district. A flasher located in Auerbach's



Large Electric Street Sign in Salt Lake City.

Department Store at one terminus of the cable produces a rapidly rotating motion of the rim.

The idea of this big sign was conceived by Herbert S. Auerbach, of the Auerbach Department Store, and was erected and will be operated jointly by the State Street Improvement Association and the Broadway Improvement Association.

The history of this shopping district is one of the strongest proofs which might be offered that "Trade Follows the Light." A few years ago this corner was completely outside of the shopping district and almost on the edge of the resident section of the city. Only a few small shops were located in its vicinity. Practically all of the retail business of the city was done on Main Street and the shopping center was two blocks away. The firm of S. H. Auerbach & Brothers, who operated a large department store on Main Street, had been buying property in the vicinity of State and Broadway. They finally decided to move their store to that location and most people declared that this would mean their elimination as an important factor in the retail trade. They built a large building suitable for use by department store on the corner opposite the one they themselves intended to occupy and induced one of the other largest stores of the city, then located on Main Street, to lease it. The two stores moved and then began their campaign to pull trade to their new location. One of the principal agencies used in this campaign was electric light. From the day of their openings these stores kept their windows, their fronts and the streets in their vicinity brilliantly lighted. As fast as more powerful and more efficient lights were introduced these were immediately installed, with the result that in a very short time these stores had drawn their old trade over to the new location, and the intersection at which they were located was one of the busy corners of the city. The erection of this sign is but one more step of the progressive business men in this vicinity to use electricity to fasten their hold on the retail shopping business of the city.

Electric Problems of the Movie Theater.

Two practical propositions for the electrical fraternity to consider have been advanced by a Louisville moving-picture theater manager. One relates to both indirect and semi-indirect systems of lighting, the other to the oscillating electric wall-fans.

The inverted bowl type of fixture for indirect lighting needs some means of protection which will prevent it from accumulating dead "bugs" in the summer. Louisville theater men, especially those in the resident districts, where the trees and lawns promote insect life, have been much annoyed by the extent to which these lighting fixtures collect "June bugs" and big and little varieties of flying things, which after dusk are drawn by any kind of light. It has proven impractical to screen the entrance and exit doors of theaters and the lighting fixtures presently become receptacles for the scorched insects which batter themselves to death against the hot globes. These fixtures are so high that it is extremely difficult to clean them out daily and the coating of dark dead bugs impedes the light rays, reducing the degree of illumination. Even a piece of "mosquito bar" would help, it is suggested.

As to the fans, where they are elevated on brackets high up on the side walls, the guards around the blades of the fan are useless, since there is scarcely any danger. A fan with the guard removed, or a new type of fan could be marketed among the picture show operators, it is suggested, or these same operators would buy used fans the guards of which have been damaged or destroyed.

Memphis Rates to Be Considered.

In connection with the visit to Memphis of F. W. Ballard, of Cleveland, the city's engineer for the proposed municipal electric plant, it is stated that the Consolidated Gas & Electric Company, and the Merchants' Power Company will make a new offer of reduced rates to the city. The ordinance authorizing the sale of $1,500,000 in bonds has finally been passed. The city has declined to accept a higher rate from the existing companies than five cents per kilowatt-hour. An offer of seven cents was made and declined. It is reported that an offer of 6.5 cents is being considered, although for the city it is insisted that the five-cent rate on a sliding scale only would be accepted.

Publicity Department Moves.—The Publicity Department of W. S. Barstow & Company, which has been located in Sandusky, O., under the management of E. Burt Fenton for the past year, has been moved to the general offices of the company at 50 Pine Street, New York, N. Y.

ELECTRICAL CONSTRUCTION

A Department Devoted to Problems Relating to the Installation, Operation and Maintenance of Electrical Equipment

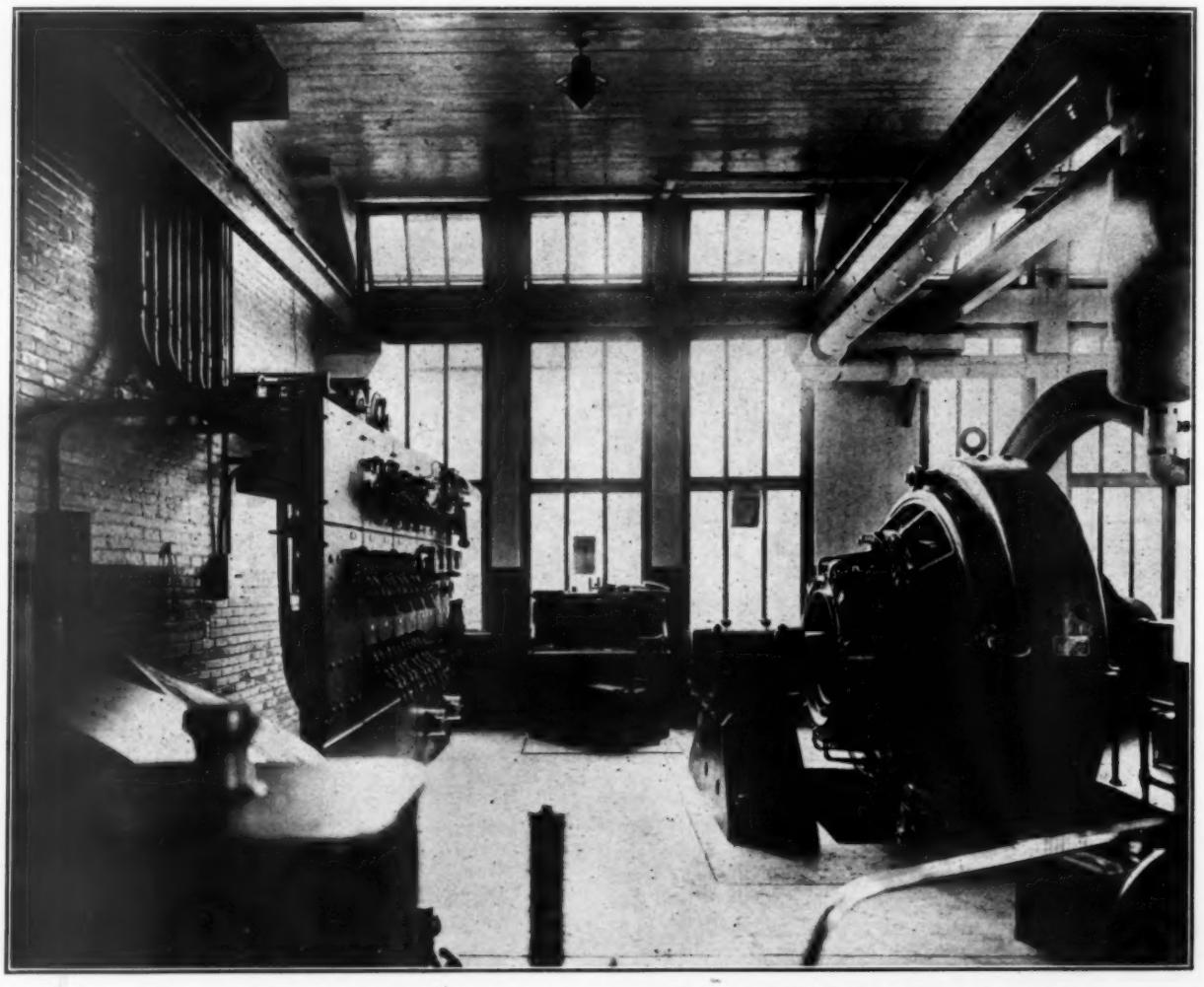
HEAVY WIRING IN A SOAP FACTORY.

Electrical Installation in the Plant of the B. J. Johnson Soap Company, Milwaukee.

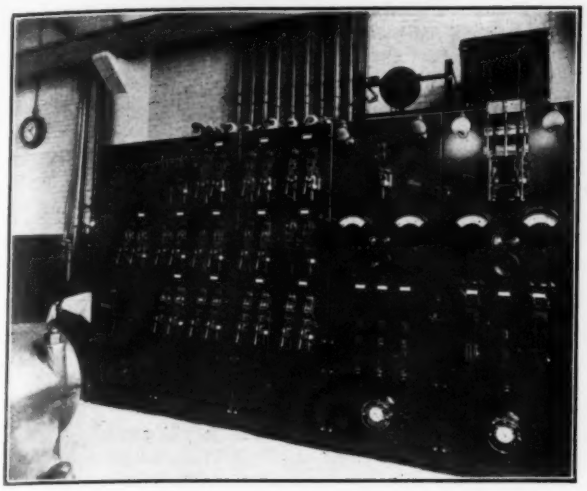
The great industrial development of this country is providing much work for electrical contractors in wiring new factory buildings and in re-wiring shops that are being enlarged or otherwise remodeled. Although factory wiring is becoming quite well standardized, occasions frequently arise where some special conditions have to be met involving construction out of the ordinary.

This is true of the electrical construction in the new six-story re-inforced concrete building recently completed for the B. J. Johnson Soap Company, Fourth and Fowler Streets, Milwaukee, Wis. This firm is well known as the maker of the popular and much advertised Palm Olive and Galvanic soaps and other toilet articles. It operates the largest soap works in Wisconsin. The plant now comprises three large buildings. One of these is a six-story warehouse located about one block from the two other buildings. The older of these two structures is of heavy mill construction and had its wiring remodeled at about the same time that the installation was put into the new adjoining concrete building. Alongside the latter a new engine room was built and equipped, to which the feeders supplying the older buildings had to be connected without interruption of service.

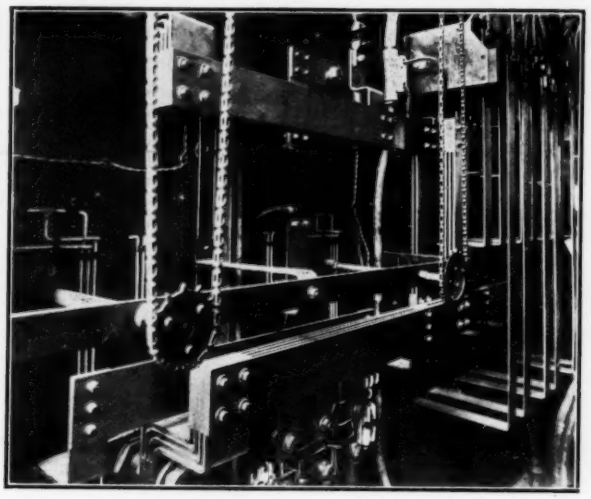
In the old plant direct current at 110 volts was used for all the lighting and power circuits. Before laying out the equipment for the new engine room the question was carefully considered as to whether it would not be better to design it for a higher pressure, say, 220 or 440 volts, so as to save considerable investment in copper cables. To have done so would have requiring rewiring many of the circuits for the higher degree of insulation necessary. It would also have necessitated replacing all of the motors in use by motors of higher voltage. To do this would mean shutting down some of the most important machinery used in the soap-making processes; while this could



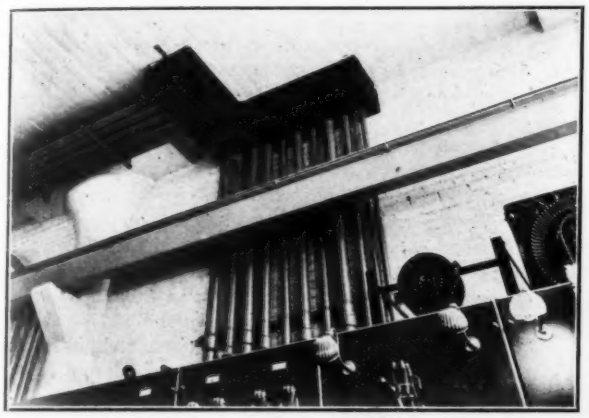
View in Engine Room, B. J. Johnson Soap Company, Showing Switchboard and Main Generator.



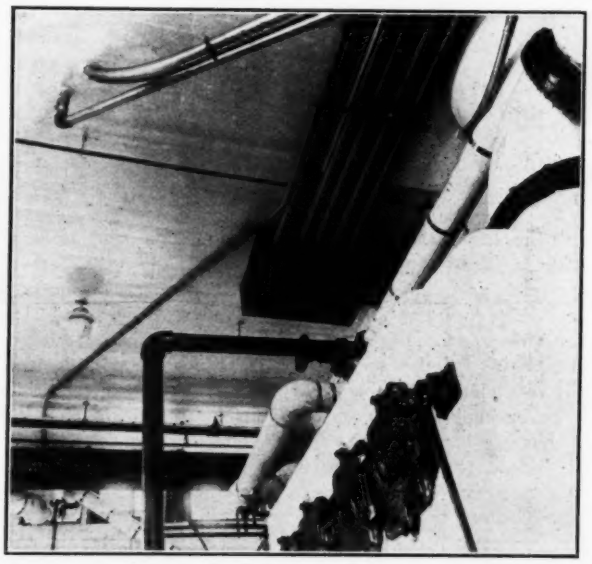
Front of Switchboard.



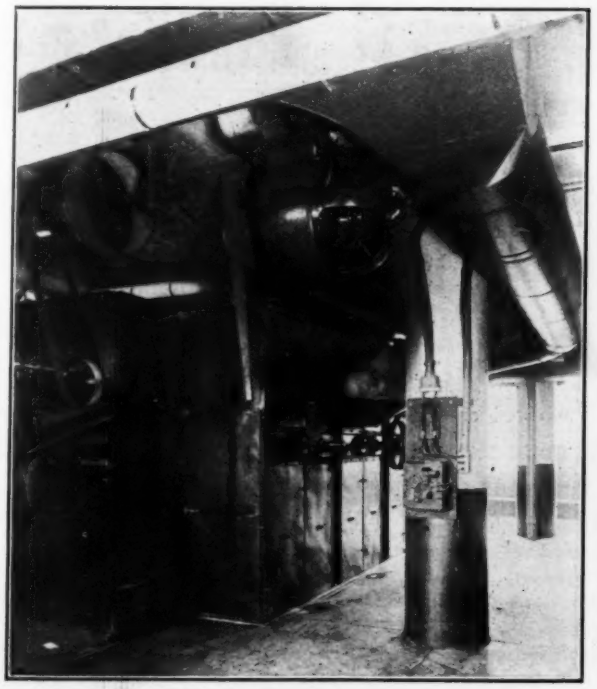
Rear of Switchboard.



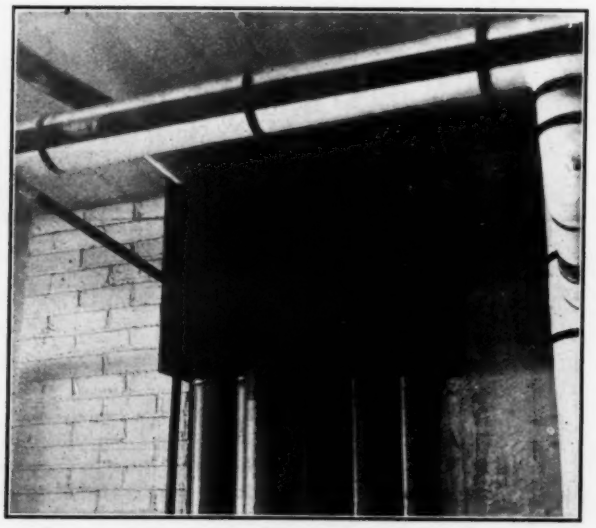
Conduits and Junction Box Over Switchboard.



Conduits and Junction Box on Ceiling of Engine Room.



Typical Motor Installation.



Typical Junction Box for Power Feeders.

have been done piecemeal, if provision could have been made for supplying both 110 and 220 or other higher voltage at the same time, it was felt by the management of the factory that this would not be advisable. The factory has been so constantly rushed with heavy orders that no possible delay could be tolerated. The previous experience with the 110-volt system had also been found so completely satisfactory that it was not desired to use any higher voltage on account of the moisture in some of the rooms. Since the matter of expense was of no consequence in comparison with the imperative need of making all changes in the old plant and of putting in the new plant without any delay, it was decided to adopt 110 volts for the new plant also.

The chief equipment in the new engine room consists of a Nordberg engine directly connected to a 375-kilowatt Allis-Chalmers compound-wound direct-current generator. There is also a 50-kilowatt generator, which is used principally during the night and on holidays for lighting and supplying the power to such motors that must be kept in almost continuous operation. The engine room also contains a motor-driven air compressor for supplying compressed air to the Lamson pneumatic tube system used in the building. There are also numerous pumps and other steam auxiliaries.

The main generator leads are carried in three-inch Orangeburg fiber duct in the floor to the switchboard. These leads consist of six positive cables in multiple and six negative cables with a combined sectional area of 1,750,000 circular mils on each side. The equalizer cables have a combined area of 800,000 circular mils. These heavy conductors connect to the generator panels at the right end of the switchboard. The equipment of the board consists of Condit circuit-breakers, the largest of which is a 3000-ampere breaker for the main generator, Trumbull switches, Weston voltmeters and ammeters, Sangamo watt-hour meters, Crouse-Hinds 26-circuit radial voltmeter and ground detector switch, etc.

The wiring of the switchboard is not very complicated but is remarkable for the great amount of copper required. The main busbars are arranged in laminated form with four separate bars each one-fourth inch thick by four inches wide, bolted together. The feeder panels from the board supply two lighting and eleven power feeders. The leads to the various power feeders are brought from their respective circuit-breakers to the connecting cables in the form of heavy copper bars. These connect at the top of the board to the power feeders which range in size from 200,000 to 700,000 circular mils. Where these feeders enter the conduits running up the wall back of the board Condulet terminal fittings are used.

On account of the necessary headroom that had to be allowed for the traveling crane in the engine room, it was necessary to provide special junction boxes for these heavy power cables. A large L-shaped box can be seen in the view showing the top of the switchboard and the conduits running up from it. By means of this junction box the cables were carried around the double bend in a compact manner. Several other large junction boxes were also required in the engine room and in other portions of the building; two of these are shown in accompanying views.

Where the conduits pass through the concrete floors a special arrangement was devised for supporting them in the floor so that the weight of the conduit and heavy cables would not be borne entirely by the junction box usually placed near the ceiling line. This consisted of two semicircular iron straps with wings by which they were clamped and bolted together around the conduit, the entire clamp thus formed being imbedded in concrete.

The motors were installed largely on the ceiling or on special platforms built for mounting them near to the machinery to be driven. The wiring of the motors was in accordance with standard practice. The starting box and main switch were placed convenient to the point at which the motor had to be controlled. A typical motor installation is shown in one of the illustrations. The number of motors installed in the new building was 43, ranging in size from 1 to 50 horsepower. All of the conduit work installed in the new building, together with all of the conduit boxes were electrogalvanized to minimize the danger from moisture present. Unilet fittings were liberally used, also Adapti concrete boxes.

In the old building adjoining the new structure the wiring was rehabilitated. For the most part this was open-work construction. Rearrangement of circuits to make a more economical layout and to better meet requirements was necessary. A considerable number of power cabinets were also installed. The boiler room of the plant was also rewired.

For the lighting in the engine room Harter Nitrolite fixtures were used with type C Mazda lamps. Throughout the remainder of the new building Holophane enameled steel reflectors were employed. One of the rooms is entirely finished in white; Pass & Seymour porcelain receptacles were used for the lighting fixtures in this case. The offices on the top floor of the new building are lighted with X-Ray indirect fixtures, white enameled.

All of the electrical installation was put in and the switchboard was supplied by the firm of Henry Newgard & Company through its Milwaukee office.

Among the Contractors.

The contract for electric-lighting fixtures in both the new high school and the Jefferson grade school at Walla Walla, Wash., has been awarded the Electric Supply & Fixture Company, of Walla Walla.

Irwin & Leighton, Philadelphia, Pa., have been awarded a contract for the erection of a new power plant for the Viscose Company, at Roanoke, Va. The same contractors will also build a new manufacturing plant for the company.

The Terrell-Hedges Company, electrical contractor, was the host of the Chattanooga (Tenn.) Rotary Club at a recent meeting, when the company gave the organization a dinner in its fixture room. The dinner was cooked electrically, even the ice cream, to the surprise of the members, being prepared by electricity. The event was pronounced one of the most successful given by the club.

WINDINGS OF ALTERNATING-CURRENT MOTORS.

Beginning with the issue of August 5 we shall publish another series of articles by Justin Lebovici dealing with the practical aspects of alternating-current motor windings. Polyphase closed windings will be fully discussed, the first installments dealing with lap or wave windings. Subsequent articles will consider open two-layer windings, single-layer windings and windings for two speeds. Special attention will be given to the mechanical design of windings and insulation. These articles are all written from a practical standpoint, insofar as the subject matter will permit, and are intended to aid those dealing with the repair and installation of alternating-current motors in solving present-day problems. The first series of articles by Mr. Lebovici was started in our issue of April 22.

Co-operation from Contractor's Standpoint

By A. C. Lyons

This subject has been discussed at many meetings of contractors, but seldom in so practical and helpful a manner as in this paper by Mr. Lyons which was presented at the recent convention of the Electrical Dealers' and Contractors' Association of Ontario. Mr. Lyons is president of the Brantford Electric Club, which has been organized on a co-operative basis in Brantford, a Canadian city of some 25,000. In this paper he tells of the excellent results already accomplished by this young organization and how they have been brought about.

In dealing with co-operation from the standpoint of the electrical contractor, I would divide the electrical business into six sections: first, the central station; second, the manufacturer of electrical supplies; third, the jobber, who is supposed to stock those supplies; fourth, the electrical contractor, who buys and is supposed to pay for these supplies; fifth, the inspection department, that passes upon the quality of the materials and their installation; sixth, and very important, the customer, from whom the preceding five sections get their revenue.

The first three sections are almost always highly organized business corporations, in violent contrast to the contractor, whose lack of organization and co-operation with his fellow contractors, together with his poor bookkeeping methods and lack of knowledge of costs, has forced him to be whip-lashed by all the other five sections, and his own also. In every line of business there is some branch which has to be "the goat." In the electrical business I certainly consider the contractor is "the goat" and I think all will agree with me there.

In a technical and practical way I have been connected with electrical matters since 1890, but for the past 17 years I have been contracting in Brantford and in dealing with my subject I shall base my remarks on things as I found them in a city of that size (25,000 population). I have seen many contractors there come and go, probably 40 at least. Those who went were practically forced out by financial difficulties due entirely to lack of co-operation, organization and knowledge of costs, rather than lack of ability; those who stayed are still more familiar with pliers, tape and solder than the cushions of a limousine.

Origin of the Brantford Electric Club.

Just here I should like to tell you about our Electric Club in Brantford, about which some of you may have heard. Up to a year ago the contractors and wiremen in Brantford were not only sore on each other, bitterly so at times, but there were grievances with the central stations and their employees and misunderstandings with the inspection department. Nearly all were sore on the business generally, but saw no way out. Finally one contractor, Mr. McLean, after many rebuffs, succeeded in getting the contractors together for another meeting. Those who attended were bored and considered it a waste of time. I know I did, and said so.

The average contractor is indifferently financed and if he keeps books at all they are indeed marvels of how not to do it. He is preyed upon by all the other interests from the central station to the public, until he can hardly be blamed if, when he gets the chance to soak a customer, he does it, and if he can put one over the central station, jobber or inspector, he has no conscientious regrets, but believes it is coming to them on general principles.

Now, all this is wrong, and at this meeting I stated my belief that the only way the contractors could get together and stick was to form a club and take in on equal standing with contractors, local representatives of the central stations, local electrical manufacturers and the district inspector. I suggested that nice quarters be secured and furnished and regular meetings held, where, on neutral ground, all grievances and differences of one member with another could be threshed out in full detail candidly, not offensively, and in the presence of all members, the object being to have a definite understanding of each other's rights.

At first it was not apparent to the central stations and a local electrical manufacturer just why they should become mixed up with what was apparently regarded as a sort of contractors' combine, possibly illegal in its aims; neither could the inspector understand. On behalf of the contractors it was explained that the club was intended to be a sort of clearing house for the adjustment of grievances and misunderstandings and the imparting of information concerning the rights of the other fellow, so that all could work in harmony and understanding and could devote the energy consumed in worrying about competitors to business proper, viz., pushing the use of electricity. They saw the point and came in.

We counted up our members in prospect, estimated our annual expenses, levied a sum to cover furnishings for the club room and arranged an annual membership fee sufficient to pay expenses. We adopted a constitution and by-laws and proceeded to get down to "brass tacks."

Obtaining Actual Cost of House Wiring.

The "brass tacks" consisted, first, in each member who was a contractor going over his time sheets and records on house wiring and turning in an exact list of the quantity of each item of material and labor on different classes of houses. The actual net cost per outlet and other interesting information was thus secured by striking an average of many similar houses. I can assure you we learned a great deal from these records.

Our next plan was to submit these records to the central stations and have their representatives go over our books and invoices to verify our cost. This may seem peculiar to some of you, but our plan was to add a fair overhead, plus a percentage profit, which would be recognized by the central stations as a fair price to charge the public and based on sound business principles. We expected the central stations then to back up our charges per outlet and we would co-operate with their solicitors in boosting business generally. The suggestion was further made and approved that the central stations' solicitors be furnished with these details, and thus be in a position to leave with a prospect an exact estimate of what his house wiring would cost, and on the back of this, of which a copy would be kept, would be printed a list of contractors, who would do the work for that price; thus the public would not be overcharged and the contractor would get a fair deal and would have no excuse for putting it over on the inspector. The jobber, knowing the contractor was working on a sound basis, would be sure of his money, and one customer would not be soaked for losses incurred on another customer's job.

In submitting our wiring costs to the central stations, we lay ourselves, as contractors, open to severe criticism. What the blank business is it of the central station what our costs and charges are? Right here is where I wish to make and substantiate my claim that the central stations are very vitally concerned. They have made a very heavy investment in generating equipment and street construction to sell "juice." If the contractor overcharges the public,

he will put himself out of business and become sore on the central station and things electrical in general. If a new contractor does not take his place, less wiring is done, and in either case the central station is forced to stock appliances and do wiring.

Co-operation of Central Stations.

Now, I do believe that all the inquiries I have made back me up that the central station does not want to do wiring or carry supplies or appliances, providing there are plenty of contractors capable and willing to assume this work and push it at a reasonable rate of profit. This is the kernel of the nut we have to crack. It is up to us as contractors to demonstrate to the central stations that we are both capable and willing to do wiring and sell appliances on a reasonable margin, and I claim and believe that the central stations are willing, yes, anxious, to have us do this work on a basis of cost plus percentage profit.

We have got together in this way in Brantford and have the support of the local central stations in our proposed wiring schedule and in the sale of appliances. So long as we do not overcharge the public, they will not butt in, and once or twice each year we will get together and go into the matter of cost and charge, so that the public is protected. Now, this is fair and right.

It may be remarked that this is a combine, and that this class of co-operation eliminates legitimate competition. Not so. If we base our charges on cost of material and labor, plus fixed percentages for overhead and profit as agreed upon, the man who has the most brains and ability to handle men can do a better job with less material and labor than his competitor.

Lining Up the Electricians.

Our idea in Brantford is to get the electricians all over the country organized into district clubs, working in harmony with the central stations and each other, on a definite and approved schedule of charges fair to the public. Let the members of clubs be licensed, after first proving their ability either by past performances or examinations. Let the floating wireman, who cuts prices and refuses to join the nearest district club, be denied a license, for we know that the man who will beat an approved schedule will sooner or later put himself out of business and in the last stages of his business career he will be a menace to the public, to the inspector who cannot always see everything, and to the dealer from whom he buys his supplies.

Co-operation of Manufacturers and Jobbers.

Another matter we took up in our club. Our walls are burlapped and paneled in mission style. There are 20 spaces 6 feet by 3 feet. We rent these spaces at a small annual fee to manufacturers and jobbers who send us not only plenty of printed matter but live samples of their wares which we receive, insure and hang up in their space until such time as they wish them returned or changed. Dealers could not afford to send these samples to every contractor, but here in the club room the contractor may, before or after the meetings or at any other time, inspect and discuss the merits of the goods, the good points of which are not always evident on circulars.

We also have a grievance committee to deal with the grievances which may develop between one of our members and some manufacturer or jobber, wherein, for instance, the latter will not make good defective goods or is somewhat arbitrary in his attitude. Full details are laid before the club by the member, which go on our minutes and the dealer in question receives a full memo from our secretary with a request to state his side, and it is our desire to deal fairly with all. Should the dealer not comply, we as individual members certainly make it a point to remind his representative about the delinquency any time he calls.

Progress in the Right Direction.

Perhaps my remarks may sound not only Utopian and optimistic, but bordering on the illegal and in some respects impossible of accomplishment; perhaps that is so, but I wish it understood from the standpoint of the Brantford Electric Club that we are seeking light and believe we are working in the right direction. We have only started and have much to learn, and we realize that there are many things to correct and amend before we adopt them finally, and at all times we will welcome from every quarter suggestions and information which we will freely pass along. We also extend a hearty welcome to any manufacturer, jobber, contractor, central-station man or inspector to attend any of our meetings which are held every other Tuesday.

We have nothing to hide; we are out to do wiring and sell appliances on a cost plus overhead, plus percentage-profit basis, and we are willing to have those percentages supervised by the central stations on any fair basis. Should, however, the central stations refuse to co-operate with us on a fair proposition of this kind and declare their intention of doing wiring at any price they see fit without according the contractor any consideration, the sooner we know it the better, and I can assure you most positively that a remedy is available to the contractors of this Dominion which is sufficiently powerful to jar even the mighty central station, and the same remedy will bring the manufacturer and jobber speedily to his knees, but it will require considerable co-operation on the part of the contractors. But why talk of all that? The electrical field is yet enormous, and there is ample room for all the central stations, contractors, jobbers and manufacturers if they will all bury the past and expend their fighting energy in helping each other to get the public to DO IT ELECTRICALLY.

It can be done, and if in the employ of any central station, manufacturer or jobber there are men so narrow-minded that they cannot co-operate for the general advancement of the electrical industry, these individuals should be dispensed with at once. The contractors, individually, simply must start anew, forget past soreness and disputes and make one mighty effort to get all competitive interests together and possibly form a club similar to our own. Again I say, it can be done, and those in the employ of any of the interests who decry efforts along this line should be severely disciplined by those in authority over them. Remember that no man is so high and mighty that he cannot be reached, and if the offender's career is systematically delved into there is no doubt he can be made to see light. Unity of purpose on the part of those present can accomplish it all and the task is not as great as might be thought.

Fundamental Basis for Co-operation.

One very vital detail must be settled and very little give and take is necessary, if representatives of the different sections mentioned at the opening of my remarks approach the subject in a proper spirit. The central stations absolutely and positively must not do wiring or sell appliances. The manufacturer must not sell to anyone but the jobber. The jobber must not sell to anyone but the contractor. The contractor must be on his job and be prepared to do electric wiring with accuracy and dispatch and at an approved rate of charges; he must also sell supplies and appliances of all kinds on a narrow margin, and he must show himself a live wire in maintaining an up-to-date stock.

These last remarks mean a whole lot, but they are vital to the whole idea of co-operation and they spell success or failure according as representatives of the different interests can meet and distinctly define the territory each interest has a right to, which likewise will indicate with great exactness when one section is trespassing on the territory allotted to another.

DOLLAR WIRING KINKS

Every reader is invited to contribute to this page. It does not matter how few words are used to explain a "Dollar Wiring Kink," provided the idea is made clear; if a diagram is necessary, a rough pencil drawing will serve. The idea itself must, of course, be new and bright. A dollar will be sent to the contributor upon publication.

Reaming Holes in Junction Boxes, Etc.

To ream out small holes in any junction boxes, switch or cutout cabinets, or any metal plates or sheets, take a round file, put into an ordinary brace and turn it backwards. This beats anything I ever saw for speed and smoothness. Arthur Assmann.

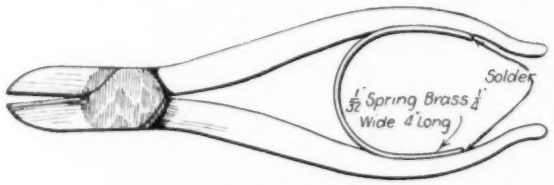
Temporary Repair on a Sign Flasher.

The spring brass contacts on a sign flasher were giving trouble from poor contact caused by lack of tension. New springs were ordered from the flasher builder in Chicago. A temporary substitute which gave satisfaction was made by using a number of rubber bands. Heavy rubber bands can be used for small motor brush tension in an emergency, pending the arrival of the broken part.

M. J. Moriarty.

Spring for Pliers.

The accompanying diagram shows a simple method of keeping one's pliers always open. Solder a flat brass spring between the handles as shown. This I find to overcome



Making Spring Pliers.

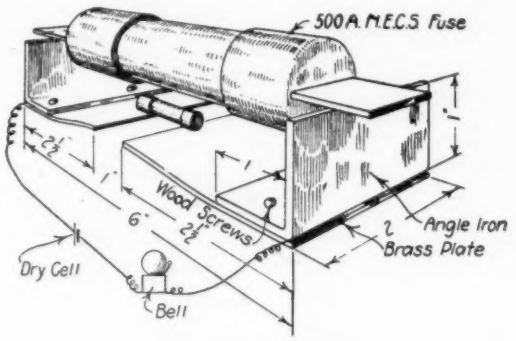
the cramp in the hand when the pliers are used continually for any considerable length of time. James McIntyre.

Making Washers.

Allow me to suggest a standard and better method of making washers than that by J. B. Story on page 117 of the July 15, 1916, issue. The tool may be bought at any hardware store. It is listed as a fly cutter or washer cutter. The cost varies from 80 cents to $1.50 for the usual kind. With this tool there is but one tool set-up and one operation at turning out any number of washers. Once set, a great quantity can be cut without grinding the tool. Mr. Story's tool method will require great care for accuracy and two set-ups and operations. There tools are illustrated and priced in the following catalogs: H. Channon, Chicago, catalog 75, page 553; Louis Hanssen's Sons, Davenport, Iowa, catalog 64, page 259; Hibbard, Spencer, Bartlett & Company, Chicago, catalog 60, page 628. H. E. Weightman.

Fuse-Testing Device.

A handy fuse-testing device has been developed in this plant where cartridge fuses ranging from the 30-ampere ferrule type to the 500-ampere, 220-volt, knife-blade type are used. Take two pieces of one-inch angle iron two inches long and two pieces of brass or copper sheets. about one-thirty-second inch thick by two inches wide and 2.5 inches long. Drill two three-sixteenths-inch holes in the angle irons and also through the plates for wood screws to fasten them on the bench or wall, as shown. Leave one inch space between the plates and six inches between the angles. Connect up a bell and battery (dry cell). In testing fuses, place the small ferrule types across the gap between the plates and the large knife-blade types



Fuse-Testing Device.

across the edges of the angle irons. Ringing of the bell indicates that the fuses are good. I have found this device very handy. J. Jungwirth.

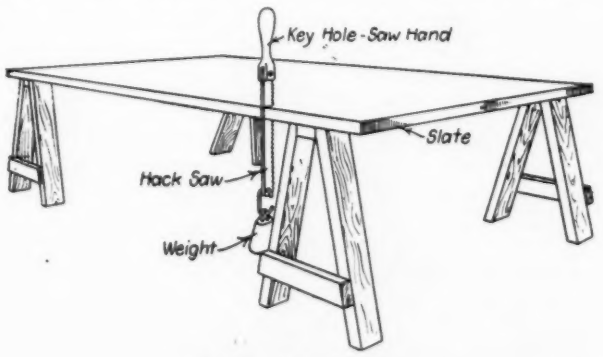
Hoisting Motors Into Place.

In nearly all industrial plants, at least the larger ones, there is a store room which is supplied with a hoisting machine, or portable elevator. I have found that such a machine is of immense value for hoisting motors into place, either for ceiling suspension or on a platform. Almost any average size of motor can be hoisted in this way and as the machine can be moved from place to place easily, it makes it very convenient to replace burnouts or install new motors without the necessity of erecting a staging for the work, thus cutting the time and labor of installation down to a minimum. In many large shops where there are many ceiling or high-mounted motors to take care of, such a portable machine will pay for itself in a relatively short time. William T. Estlick.

Cutting Slate Panel.

In cutting a panel out of a large slab of slate recently I found that the panel was going to be too big to permit using any hack-saw frame that I had on hand. Therefore I used the following scheme with excellent results:

I took a keyhole-saw handle and fitted it with a hack-saw blade. Then in the hole at the other end of the blade



Cutting Slate Panel.

I put a hook on which I placed a weight, this serving to steady and keep the blade from buckling. I found that this operated just as satisfactorily as a hack-saw. I used a hack-saw in preference to a hammer and chisel on account of the liability of slate to crack when a chisel is used.

Wm. A. J. Hahn.

THE DEALER AND STOREKEEPER

An Exchange of Ideas and Experiences on Advertising and Selling Methods, and Store-Keeping for the Dealer in Electrical Goods

VARIOUS PHASES AND ANGLES OF CREDIT INSURANCE.

Suggestions Concerning the Insurance of Electrical Dealers from Loss by Unpaid Accounts.

By W. B. Parker.

While discussing the general subject of collections with a Chicago business man the other day, he indicated an interest in the practical workings of the various credit insurance plans. I have given this subject rather thorough consideration at different times and was glad to give him the results of my investigations. He expressed his belief in the soundness of the conclusions I arrived at and said he thought the subject one of general interest and that an article on this subject would be welcomed by readers of business efficiency articles.

The idea back of the credit insurance is that it is possible to insure business men from loss by unpaid accounts as it is to insure them from loss by fire, or to insure the individual from loss by accident. But in all these cases the negligence of the insured must be provided against. In credit insurance, as in the other forms of insurance, numerous conditions are stated in the policy that the insured must meet in order to have the policy of value in case of loss. It therefore follows that the value of such insurance depends both on the reliability of the issuing company and the possibility of the insured meeting the conditions laid down in the policy.

Solicitors of some companies go after the business of the retail grocer, for example, on the strength of the indorsements from manufacturers and wholesalers, sometimes not of that particular company, but of the plan of credit insurance in general. As a rule, the retailer taking out such a policy does not read the provisions very carefully and is exceedingly likely to have trouble in securing a settlement from the company for losses which, as he supposed, he was fully protected against by his policy. As a matter of fact, however, he had made no attempt to comply with the conditions of the policy and in reality had no claim whatever against the company. He did not stop to think that it would be an impossibility to insure him against such losses as might be incurred on account of his failure to use ordinary prudence in the granting of credits, and the insurance companies doing this class of business lay down a set of credit rules in their policies that require a great deal more than ordinary prudence.

In the case of wholesalers and manufacturers having an organized credit department the value of credit insurance is more apparent. In such cases the insurance is taken, not to protect them from loss through their own carelessness, but from loss through failures that can hardly be forseen. That is, all their ordinary credit precautions are in use, but in spite of the credit information they are able to secure through mercantile agencies and other sources every once in a while one of their customers finds himself in the bankruptcy court and the creditor is out the amount of the bankrupt's account. The question then arises as to whether an insurance company is better able to afford the loss in consideration of the total premiums paid than the creditor would bt to take this risk himself and devote the amount of the premiums to the strengthening of his credit department. This problem is one that has been solved differently by different men, but the fact must be kept in mind that many wholesalers and manufacturers prefer to pay the premiums and let the insurance company stand what losses may occur.

One valid reason for buying this form of insurance is that the credit rules laid down are a distinct aid to the credit man in guiding himself in the various phases of the extension of credits as they come up from day to day, and also furnish the best of excuses for refusal to extend credit in a given case, without also giving offense. If the customer can not come up to the requirements of the credit indemnity company, then there is good reason for the credit man to turn him down. Some men I have met feel that the holding of credit insurance is a distinct and favorable factor in keeping the credit department up to the mark. The opposite view, especially where profits are reasonably large, is that such insurance hampers the work of the credit man in that he is afraid to take chances at all, and thereby may lose a large amount of profitable business. In other words, this man feels that he is willing to suffer a reasonable percentage of loss rather than turn down apparently profitable business, merely because it does not measure up to the standard set by the insurance companies.

This article is not designed as a brief either for or against credit insurance, but merely to bring out the conclusions of those who have given the subject the most study and also to indicate where the credit requirements of such insurance companies may be beneficially applied, even where the insurance is not desired. It would certainly be well worth while to go over such a policy and see how many requirements the insurance company makes that could be advantageously added to your own credit requirements. The writer believes that in many lines the rules are more strict than is necessary, but this should be decided by the individual and should be judged principally by the percentage of profit in the transactions and the class of customers who form the bulk of the trade. Where the percentage of profit is high and the bulk of customers are of the poorer class of business men, then the restrictions laid down by insurance companies may safely be modified.

The value of such an insurance policy to the retailer, for the purpose of gleaning the principles of safe credits, is, of course, as great as it is to the wholesaler and manufacturer. However, the retailer should be very sure that he fully understands the provisions of such a policy before depending on it to protect him from losses from bad debts. Too often the solicitor encourages the belief that the policy works automatically—just buy it and no further loss can be suffered from slow accounts. This attitude of solicitors for some of the credit insurance companies has served to discredit the real advantages of this form of insurance, and to disgust retailers who have bought policies blindly, so that they are not willing to give the subject of credit insurance the consideration that it really deserves.

Features of a Modern Lighting-Fixture Store

Plans and Appointments of New Fixture Showrooms of the Sechrist Manufacturing Company, of Denver, Are Novel and Up-to-Date

AFTER manufacturing a stock of electric light fixtures of the best grade the next important move, according to the Albert Sechrist Manufacturing Company, of Denver, Colo., is to maintain a show room that will best display the stock. Acting along this line the concern has just completed an establishment for that purpose, at Seventeenth and Tremont Streets in Denver, and it is one of the best of its kind in the West. Everything used in the appointments and arrangements of the salesroom is of the best quality and is planned to set off to the best advantage the stock on display there. Time and expense have not been spared to bring about the desired effect, and the result is that the store is a credit to the Sechrist people and serves as a good advertisement to them; which acts as an aid in increasing the business of the firm.

The idea of making an attractive exterior to obtain the attention of the people passing the store was used. Carrying out this plan the window displays were arranged to give a good insight into the kind of goods the firm offers for sale. The window space is divided into sections wherein are displayed

Office of the Sechrist Store, Showing the General Stockroom at the Left.

different styles of lighting fixtures. These are well set off by backgrounds to represent home and office interiors. The only departure from this scheme is one section of the Seventeenth Street side of the store where the "mirror room" of the showrooms is in full view to those passing the store. This in itself forms a very effective window display.

Each lighting fixture on display in the windows bears a tag on which is plainly written the price of the article. A person viewing the store from the outside can instantly see from the arrangement of the window displays and goods on exhibition there that the policy of the store is one that stands for quality and prices that are in keeping with that quality.

Office and Reception Room.

So much for the outside of the store. The first room one enters on going into the store is the office and reception room. This room contains a show case filled with different electrical

Demonstration Room in the Sechrist Store, Showing the Dining-Room Effect.

merchandise handled by the firm, and also contains the desks of the manager and cashier. The room is beautifully decorated and the idea of quality is carried out everywhere. The lighting fixtures that are displayed in this part of the store are those that are best adapted for office use, and their surroundings set them off to good advantage.

Stock Room.

The general stock room is adjacent to the office. Built into the walls of this room are lockers, and in these lockers is stored electrical merchandise stock handled in the store. The arrangement is a simple one and at the same time it gives a neat appearance at all times and makes the room an easy one to keep clean. The stock that is called for most often is stored in the lockers near the floor. That called for not quite so often is stored in lockers a little higher, and so on up to the ceiling. The lockers are all plainly labeled in order to aid the salesmen in quickly finding what they want.

Main Showroom.

The main show room is also adjacent to the office. In this room inverted electric-lighting fixtures are featured almost exclusively. A table and chairs occupy the center of this room, and the customers may be seated and talk over the matter of lighting their homes or offices with a salesman just as long as he or she pleases. While they are talking the salesman has at hand lighting fixtures of every style to illustrate what he is saying along that line. If a customer wishes to see just how a certain fixture looks when illuminated the salesman presses a button and accommodates him. Every lighting fixture in the store is wired and can be lighted to suit the pleasure of anyone visting the showrooms.

On one side of this main room are four small display rooms, while on the other side are two more rooms of the same type. These rooms are fitted up with different kinds of wall and ceiling lamps, and each room is decorated in such a way as to best set off the fixtures it displays. One room has crystal lighting fixtures and the walls are decorated in white, and so on down the line one finds the color schemes of the walls harmonizing with the fixtures.

The fact that all these display rooms open into the main room makes it possible for a person to stand in the center and view the different styles of lighting fixtures at almost the same time. In this way a customer is able to compare the different types as to styles, quality and the like. If this were not possible many times a customer would purchase a cheaper grade of fixture, as he would come into the store with his mind made up on the price he wished to pay. After he sees the different priced fixtures together, however, and is able to see the difference he will, in many cases, buy a fixture that cost more than he intended to pay in the first place. One of the small display rooms at the Sechrist store is furnished with lamps of cheaper grades and prices than the others, and the fact that they are displayed near those of much better quality results in many sales being made of the higher priced goods than there would have been otherwise.

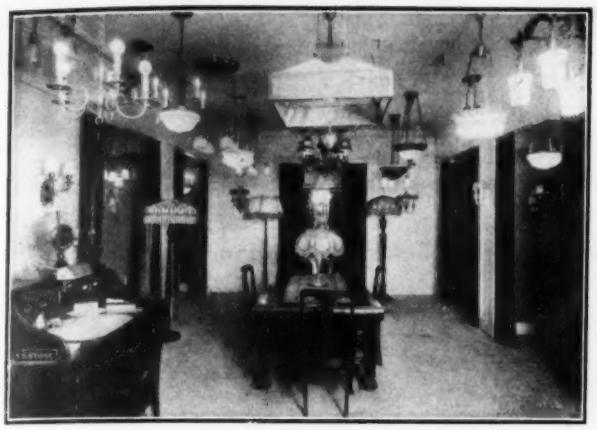
Dining-Room Display.

The display room opening from the end of the main room is fitted up as a dining room in a modern home. Here lighting fixtures for the ceiling, walls and table in a dining room are well set off by furnishings and decorations that go to make up a room of that kind complete. A person entering this room is at once made to feel "at home" by the surroundings. Not only that, but a customer is able to judge just how the lighting fixtures on display there will look in his own home without a very big stretch of his imagination. There is nothing in this room to suggest a store, and everything does speak of a room in a modern home, which makes the buying of lighting fixtures for the home much easier.

The "Mirror Room."

On one side of the dining room is the "mirror room," while on the other is the storeroom for small damp globes. The mirror room has mirrors arranged on two of its walls in such a way as to reflect articles in the room many times, and a person looking into the mirror would imagine there was at least a whole block of rooms just alike—one right after another. The mirrors help to make a very attractive room and aid in displaying the fixtures in it. Portable lamps are featured in this room. The largest ones are on display on a table in the center, while the others are shown on shelves running around three sides of the room. These shelves are about the same height from the floor as a table and the space beneath is curtained off and used for storing extra stock. When the lamps are turned on the reflection of the many colored shades certainly makes a very pretty picture in the mirrors, and is a scheme that is bound to attract attention from those visiting the store. Thus they become interested, their attention is drawn to the lamps and sales result.

The other room opening from the dining room has racks built around the walls on which are displayed small lamp globes in a way to make them easily viewed by customers. In this room, as in the general stock room, a study of the demand has been made and the globes that are in greatest demand are



Main Salesroom and "Mirror Room" in the Sechrist Store—Two Salesrooms With Very Attractive Appointments.

placed on the racks where they can be easily reached. They are arranged so they can all be seen without removing others and so the chance of loss of breakage is greatly lessened.

In the entire arrangement of the saleroom the "home" idea is carried out, and everything, as far as possible, is done to convey this idea to visitors at the store. Soft carpets on the floors, wall and ceiling decorations, as well as furnishings, are well in keeping with the same found in many of the best homes of the present day. The store is also kept in "spick and span" condition—no dirt is allowed to gather. Then there is a place for everything and everything is kept in its place. This clean, bright, homelike atmosphere tends to put a customer in a cheerful frame of mind; and so it is much easier for a salesman to make a sale in that case than it would be if the reverse were true.

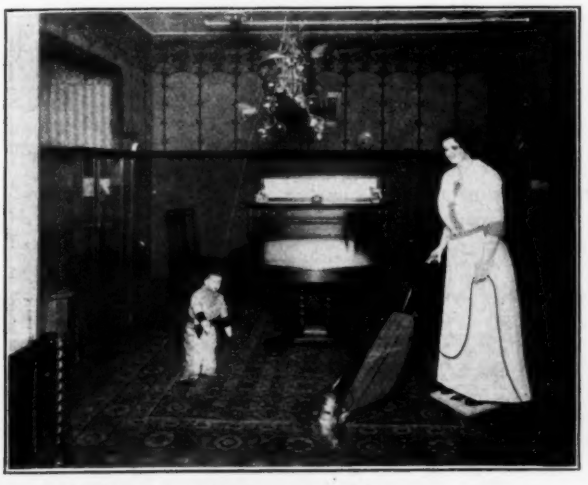
The salesroom of the Albert Sechrist Manufacturing Company is under the efficient management of K. L. Francis, whose work has gone a long way toward making the store the successful showroom that it is.

Appliance Business Brisk in Philadelphia.

The sale of electric fans in Philadelphia is reported to be very brisk. Though cool weather in June and early July retarded the usual run of trade, the recent hot spell has in large measure compensated for the early coolness. Walker & Keppler, jobbers and contractors, at Fifth and Chestnut Streets, state that their sale of oscillating fans is ahead of almost any other year. The local trade calls mostly for 12-inch fans, while there is also a considerable demand for the 16-inch size.

The 12-inch alternating-current fan of the General Electric Company make sells in Philadelphia, with swivel and trunnion, for $14.75. Sixteen-inch fans of the same type sell for $18.25. Prices for the 12 and 16-inch oscillating type are $18.25 and $21.50, respectively. The above concern reports a limited call for 6-inch fans. Its wiring business is excellent, keeping up with unaccustomed volume through the usually dull summer months. This condition is largely due to the house-wiring campaigns now being conducted by the Philadelphia Electric Company, and its rate reduction for house lighting. The local lamp business is above normal summer sales.

Another important Philadelphia house, that of J. F. Buchanan & Company, on upper Chestnut Street, in the residence district, finds large sale for a 6-inch fan called the "Polar Cub," which it is featuring in its window displays. This fan meets the needs of large numbers of flat dwellers, roomers and others whose duties keep them in the city in the heated season, and who do not care to invest $10 to $15.



Two Prize-Winning Displays in the Recent Contest Between the Byllesby Properties.

The window display shown on the left was awarded first prize in a competition between 12 of the electric companies operated by H. M. Byllesby & Company. The display was originated by B. H. Clingerman, general superintendent of the Mobile (Ala.) Electric Company, and showed the contrast between the old and the electric way of doing the family washing. The display shown on the right was the winnner of the second prize and was exhibited by the Oklahoma Gas & Electric Company, Oklahoma City, W. P. Jones, general contract agent, being the originator. This display consisted of an animated female figure, which operated an electric vacuum cleaner to pick up confetti, rice, etc., dropped on the carpet by a mechanical doll. The displays were judged by the publicity department of H. M. Byllesby & Company, the awards being made on originality, simplicity, attractiveness and effectiveness of the exhibits.

NEW APPLIANCES

A Weekly Review of the Latest Developments and Current Information Respecting Electrical and Kindred Mechanical Appliances

Handy Portable Reel Lamp.

A new type of adjustable portable lamp with several improved features has been placed on the market by the Rubes Electric Devices, Incorporated, 255 Classon Avenue, Brooklyn, N. Y. It is a compact, light weight and neatly-finished unit that can be used for a variety of purposes. It can be used as a table, desk or piano lamp, or as a portable that can be hung up almost anywhere. On the bottom of the base is a double spring clamp, by which the unit can be snapped to the edge of a mirror, chair, bed, etc. Means for hanging it on any wall hook are also provided. The clamping device is covered with rubber tubing and the base has rubber buttons to prevent scratching surfaces on which it is placed.

The base of the lamp containing the reel can be readily removed to see how the reel or contacts operate. About eight feet of connecting cord is provided; this can be instantly coiled up on the spring reel within the base by merely pressing a release button. This obviates any loose or dangling cord. Phosphor-bronze spring contacts connect the inner end of the reel with the lamp circuit. Just below the Cutler-Hammer push-button socket is an adjusting hinge which permits changing the angle of the lamp through over 180 degrees. The stem can also be swiveled. The lamp shade, which is supported from the socket, is also freely adjustable so as to reflect the light where wanted. Every feature of the outfit is well made and the whole unit arranged so it will readily appeal to purchasers.

Rubes Portable Reel Lamp.

Electric Motor for Phonograph Drive.

The great popularity of the phonograph has called for the development of an electric motor specially adapted to operate the instrument without the need for the frequent and annoying winding up of the spring. Such a motor has now been placed on the market by the Arnold Electric Company, Racine, Wis. It is called the Arnold Phonomotor and is a small, light motor that can be readily placed alongside the metal disk on which the disk records rest. The motor has a small rubber-covered drive wheel that operates the phonograph disk through direct friction drive. Before setting the motor against the disk, the regular spring is first allowed to run down and the crank removed. The motor than takes the place of the spring. It is said that the regulating device can be used just as formerly and the motor can be instantly removed and the spring again used, if desired.

Arnold Phonomotor.

This is a universal motor that can be used on either direct or alternating-current circuits of 110 to 120 volts, being connected to any socket or similar outlet. The motor is very quiet running. It is protected so as not to scratch any polished surfaces and is handsomely finished in either triple nickel or triple gold plate, making it an attractive addition to the phonograph.

New Conduit and Pipe Wrenches.

The increasing use of conduit in electrical construction calls for the most improved facilities in the way of tools to insure better and quicker installation. To meet this growing need, the Mechanical Specialties Company, 122 South Michigan Boulevard, Chicago, has placed on the market a line of new conduit and pipe wrenches, of which Fig. 1 shows what is known as the La Rock wrench.

This wrench is especially suitable for conduit work, particularly where a large amount of one size has to be put up. This wrench is distinctive for several features. It has only three parts and is free from ratchets, pins, springs, etc. It is not adjustable for different sizes, but each wrench is made for one particular size of conduit or pipe, for which it fits exactly. It has a compound movement that acts similarly to a toggle in its powerful grip. Instead of tak-

Fig. 1.—LaRock Compound-Movement Conduit and Pipe Wrench.

ing hold of the pipe at but two points, it grips it around two-thirds of the entire circumference, thus avoiding crushing and insuring against slippage. The wrench is made of drop-forged steel with special steel rivets. It can with-

Fig. 2.—Como Adjustable Pipe Wrench.

Fig. 3.—Parts of the Como Pipe Wrench.

stand a much greater strain than can be applied by a powerful man. Its use is especially suitable where conduit is put up in corners or very close to walls or other surfaces or other obstructions that make use of ordinary wrenches practically impossible. Being free from adjustments, it is also especially convenient where long runs of the same size of conduit are being installed. The La Rock wrench is made in several sizes, of which the three-eights, one-half and three-quarter-inch sizes are most in demand.

Fig. 2 shows the Como adjustable pipe wrench. This tool also consists of but three parts, as indicated in Fig. 3. Its simple construction insures that it will not get out of order. This wrench is made of high-grade tool steel and is so shaped as to make every portion effective for strength without superfluous weight. The jaws work against each other and provide an instantaneous grip like a vise, free from short stops, jarring and slippage. Como wrenches are made in five sizes, ranging from 7 to 24 inches in length.

Two forms of what are called the Eagle Claw wrenches are shown in Figs. 4 and 5. This name is derived both from the shape of the jaws and the security of their grip. The wrench shown in Fig. 4 has its jaws at right angles to the stem, while that in Fig. 5 has the jaws making an angle of 45 degrees with the stem. Each of these wrenches is readily adjustable in small steps up to two inches, according to size. They are of very simple construction and

Fig. 4.—Eagle Claw 90-Degree Wrench.

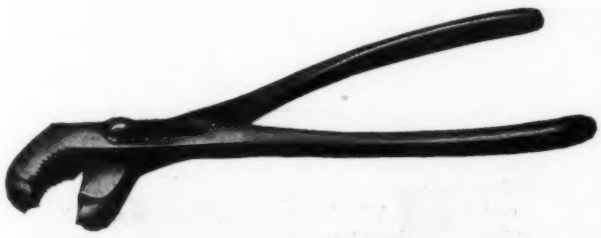


Fig. 5.—Eagle Claw 45-Degree Wrench.

therefore not likely to get out of order. These tools are made of drop-forged steel. They are especially useful for difficult grips, regardless of whether used for round, square, hexagonal or differently shaped nuts, rods, pipes, etc.

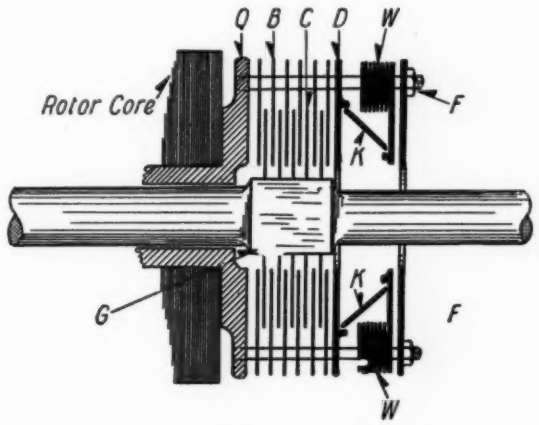
Multiple-Disk Clutch for Split-Phase Motors.

The single-phase induction motor designed with a split-phase winding for starting and not equipped with some other auxiliary device seldom develops more than full-load torque at starting. For many applications, notably pumps, the split-phase type of motor is desirable, but it must have a starting torque greater than full load. In order to accomplish this a clutch, similar to that used on an automobile is applied to the single-phase motor.

The function of the clutch is to allow the rotor of the motor to reach nearly full-load speed before the shaft and its connected load are started. The two members of the clutch are then automatically engaged and the shaft exerts approximately two times full-load torque upon the connected load.

The early clutches were of the drum type in which weights were held close to the shaft by springs. When a certain speed was reached, centrifugal force carried the weights out against the drum and the friction between them and the inner surface of the drum brought the shaft up to speed.

In the latest design of motor the drum type of clutch has been abandoned for the multiple-disk clutch. This is very similar to the type of clutch so successfully used upon all modern high-grade automobiles.



Multiple-Disk Clutch for Split-Phase Motors.

The type CA multiple-disk clutch has been developed by the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., for its split-phase induction motors, and has a number of advantages over the old type of clutch. A high starting torque is developed, the motor picks up to full speed under heavy and increasing loads, and a smooth acceleration of the driven machine is obtained, as well as overload protection for the starting winding. Centrifugal weights are used to operate the clutch as before, but instead of the weights themselves pressing against a drum, the friction between alternate plates of steel and phosphor bronze is used in locking the rotor to the shaft.

An idea of the method of operation can be obtained from reference to the accompanying illustration. The weights are shown at *W* and fly out when a predetermined speed is reached. This compresses the plates through the toggle links *K*, which force down the pressure disk *D* against the alternate disks shown at *B* and *C*. The weights are normally pulled toward the shaft by springs, which are omitted in the diagram to prevent complication of the drawing. The rotor spider *Q* carries phosphor-bronze plates upon the studs *F*, while the steel plates have square holes in the center which fit upon the square portion of the shaft shown at *G*. Thus one set of plates must turn

with the rotor, while the other set must turn with the shaft.

The clutch is rugged in every detail and is positive in operation, the toggle links multiplying the forces of the weights upon the friction plates.

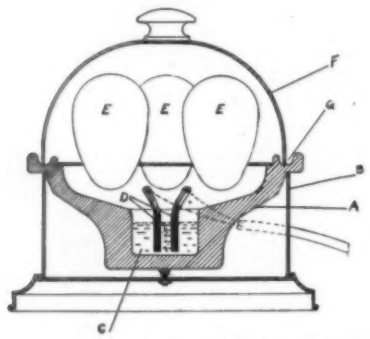
The weights and springs are so adjusted on both the clutch and the switch, used to open the starting winding, that when the motor is operating, the switch must open before the clutch starts the shaft. When the motor is retarded by an overload the clutch will slip before the starting-winding circuit can be closed. This gives absolute protection against burnout to the starting winding.

Slots are cut in the friction disks to prevent warping when one portion becomes heated more than another, and they also assist in clearing the clutch of oil and dirt. The disks are arranged so that they can be easily replaced should they become scored or burned due to prolonged overload, but in no way can the operating mechanism be harmed.

The split-phase motor equipped with this clutch is said to give the highest starting torque that can be obtained from a split-phase motor and it will bring up to speed any load it can start.

Unique Electrical Egg Cooker.

A new electrical cooking device has recently been put on the market which, among other novel features, does not make use of heat developed in resistance wires, but instead forms steam by the passage of current directly through a small amount of water in sufficient quantity to



Sectional Diagram of Ruvio Electric Egg Cooker.

cause the water to boil. This device is used principally for cooking eggs and in this connection the use of a graduated quantity of water will allow of a regulation of the degree to which the eggs are cooked without any further watching, the circuit breaking automatically when the water has been boiled away. The cooker is so arranged that it will cook the eggs to the same extent whether there is one egg or more and whether the eggs are large or small.

The following description of this device will make these points apparent: A porcelain dish *A* is held in a nickel-plated base *B* by means of a special bolt. The porcelain dish has a small well *C* located in its center and in this the two carbon electrodes *D* are placed. The cover *F* sits in the groove *G* of the dish *A*. This groove is of sufficient capacity to hold as much water as the well *C* will hold. The eggs *E* are placed in a perforated metal holder. A separable plug is connected to six feet of parallel cable which leads the current to the two carbon electrodes.

The operation is as follows: A measured quantity of water is placed in the well from the measure, which is filled up to the desired point by covering one or more of the holes with the fingers, thus determining the degree to which the eggs will be cooked, whether soft, medium, or hard. When the current is turned on a sufficient quantity flows through the water between the carbon electrodes to cause the water to boil almost immediately. The resistance of the water is materially reduced by the carbons which contain sufficient salts to insure satisfactory operation at all times. Salt must never be added to the water in the bowl, as it is impossible to add a sufficiently small quantity.

For the uniform cooking of different size or different numbers of eggs, it will be apparent first of all that the amount of steam condensed on the surface of the egg will be approximately proportional to the amount of heat absorbed by the egg. Thus when steam first begins to form, the eggs are cold and will absorb a great deal of heat and the condensation on their surface will be great. It is obvious that a large egg with greater surface will condense more steam than a smaller egg. Now, as the eggs are placed directly over the sloping sides of the bowl, all this condensed steam will run into the well and will be evaporated by the heating action of the electric current. On the other hand, the steam which is condensed on the inside of the cover will run down into the groove *G* and remain there. Therefore, when the eggs have become heated to the point where condensation no longer takes place on their surface the water in the well will boil out and be condensed on the cover, meantime cooking the eggs to the desired point. Finally the water will all be boiled out of the well, thus automatically turning off the current just when the eggs have reached the desired turn to fit the individual taste for which the water measure was set.

It is particularly to be noted that not more than one and one-half teaspoonsful of water need to be boiled to cook four eggs, as compared with the kettleful that used to be necessary. The economy of this is obvious. Furthermore, it is said that no one who has eaten eggs cooked by steam will ever want to eat the old-fashioned boiled eggs again. The whites are never tough as they are in boiled eggs, but always tender and delicious.

This same device when used for warming baby's milk is a household convenience that fills a long-felt want. It is impossible to burn or scorch the milk and it is unnecessary to watch it while it is warming. It is simply necessary to turn on the switch and the steam from a couple of teaspoonsful of water will warm the milk bottle to just the desired degree.

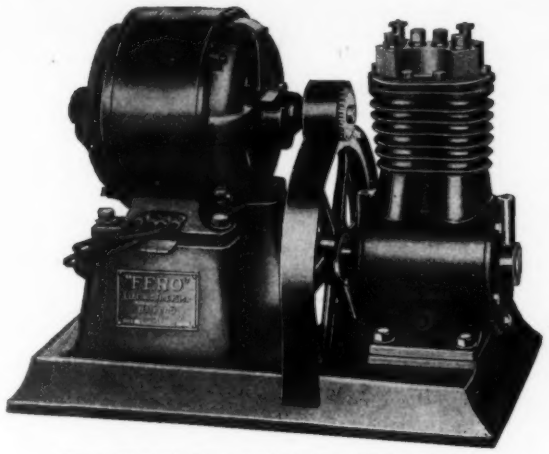
Other possibilities for this form of electric heater are being developed, as it is apparent that it can be applied for all sorts of steam cooking as well as warming liquids and sterilizing material by steam. The device is manufactured and sold by the Ruvio Electric Company, Incorporated, 50 Broad Street, New York City.

Fero Electric Tire and Garage-Service Pumps.

Originally the only use for compressed air in the garage was for the inflation of tires. Hence compressors designed for this particular service are still generally known as tire pumps. The field of application for these tire pumps has broadened, however, now including such additional uses as operating small pneumatic tools, spraying, blowing dust and dirt from cars, and in vulcanizing work. Although still designated as tire pumps they are more rightfully compressors, and their use has become so general that they are now practically indispensable in the modern garage.

The compressor illustrated is of particular service in the private and small public garage. It is made by B. M. Fero, 509 Penwood Avenue, Wilkinsburg, Pa. A complete line of such machines is designed to take care of the requirements of both private and public garages and service stations. Westinghouse alternating and direct-current motors are used exclusively in equipping these compressors, which are made in portable and stationary form in various sizes.

Undoubtedly the greatest convenience and service is obtained when a motor-driven compressor is regulated by an



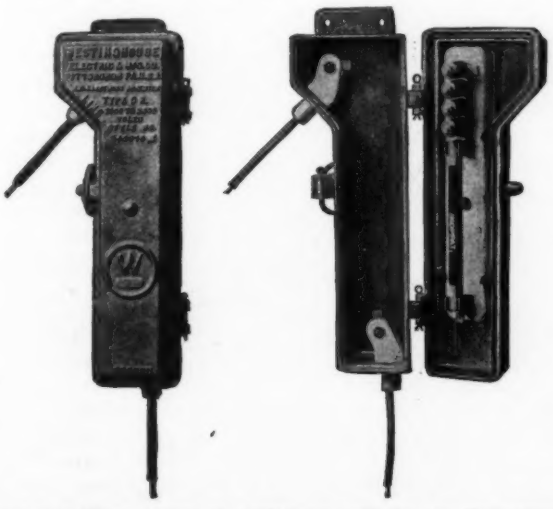
Fero Electric Tire and Garage-Service Pump.

electric pressure controller. It will unfailingly start the motor at the minimum pressure set for and stop it at the maximum pressure, insuring ample tank pressure day and night without attention other than an occasional oiling. The stationary form of compressors of this manufacturer, when designed for use in connection with an air tank and not for direct inflation, are furnished with suitable electric controllers when desired.

Single-Pole Lightning Arrester for Distributing-Transformer Protection.

For use on alternating-current circuits of any frequency, and from 1,000 to 2,500 volts, and of unlimited capacity, the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has recently placed on the market the type CR lightning arrester illustrated herewith. This type of arrester is for pole mounting and is similar in many respects to the type C arrester made by the same company, with the addition of a series resistance. It consists of four knurled, nonarcing, metal cylinders, mounted on a porcelain base, with a series resistor which is held by fuse clips, the whole being mounted in a cast-iron box.

The arrester unit is mounted on the inside front cover of the box, so that it is automatically disconnected from the circuit when the box is opened. This safety-first feature eliminates all danger of accidental shock to linemen when making inspections and repairs. This method of mounting the arrester unit is especially desirable in an arrester of this kind which will ordinarily be used in considerable numbers on a line and receive routine inspection. Like the type C, the new type CR arrester is designed particularly for the protection of distributing transformers and is said to be unlimited in application.



Closed and Open Views of Lightning Arrester for Transformer Protection.

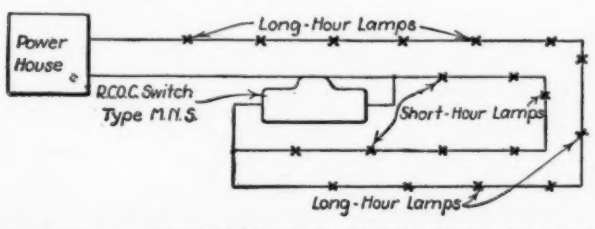
Electric Cooking Equipment on Freight Steamer Proves Very Satisfactory.

In the ELECTRICAL REVIEW AND WESTERN ELECTRICIAN of January 8, 1916, page 85, was given an account of the electrical equipment of the new freight steamship *Nevada*, which is operated by the Goodrich Transit Company exclusively in freight service, making regular trips, all the year round, between Chicago and various Lake Michigan and nearby ports. A noteworthy feature of this steamer is the complete electrical equipment of its kitchen. This comprises a large hotel type electric range with eight hot plates on its cooking surface and two electric ovens; there is also an electric broiler and an electric bake oven. This cooking equipment is capable of furnishing the entire needs of about 125 persons, although as a rule the officers and crew comprise about 90. All of the meals are electrically cooked. The installation is noteworthy because it is exceptional to find a freighter equipped in such a modern way.

This equipment has been in constant service since the steamer was put into commission last November and it has given such satisfactory results that the company has been greatly pleased that the equipment had been installed. No data have been kept of the exact costs of operation, since it was felt that the economy was all that could be desired and this combined with the other advantages of electric cooking have furnished abundant reasons for using the equipment continuously. Among these advantages the principal one is the elimination of fire hazard, which is so common in steamer kitchens where fuel is used; a very economical layout of the kitchen together with prompt service and very excellent cooking results have also been obtained. This cooking equipment was furnished by the General Electric Company, Schenectady, N. Y.

Remote-Control Oil Circuit Switch.

In an article describing the remote-control oil circuit switch manufactured by the South Bend Current Control Company, South Bend, Ind., which appeared in these columns in the issue of July 15, 1916, an error was made in the diagram designated as Fig. 7, the connections of the R C O C switch being improperly made. In the diagram herewith the correct connections for the switch are shown. It will be observed that the switch short-circuits the loop containing the midnight or other short-hour lamps, leaving the all-night lamps undisturbed. The control for cutting off the former lamps is obtained at the power house without running a separate control wire to the loop. The ordinary wiring of such series circuits involves running an additional series circuit back to the power house. Use of the new switch obviates this and also saves the cost of an additional panel.



Connections of Remote-Control Oil Circuit Switch for Short-Circuiting Short-Hour Lamps.

Exhibitors at National Contractors' Meeting

The following is a brief account of the various exhibits which were maintained in the Terra Cotta Room of the Hotel McAlpin during the convention of the National Electrical Contractors' Association at New York, N. Y., July 17 to 22:

American Conduit Manufacturing Company, Pittsburgh, Pa.—This company had an attractive display of wiremold, which is a new material designed to meet the demand for a surface wiring material which would be comparatively inexpensive, of small size, easy to install and which would require few fittings. The fittings are of small design and are arranged wherever possible for use with standard fittings and material. It is said to be the first wiring material to be provided with a finish that blends with the color of the average wall upon which it is used. It is installed so much like conduit that no special experience is needed to use it. The exhibit attracted considerable attention by the contractors.

The Consolidated Lamp & Glass Company, New York, N. Y.—A number of new styles of electroliers and fixtures were shown by this company.

Cutler-Hammer Manufacturing Company, Milwaukee, Wis.—A complete line of Cutler-Hammer specialties was shown. These included equipment for residences, store and industrial installations, the latter including push-button control equipments for motor installations. Numerous other specialties of this company's manufacture were shown.

Deuth & Company, New York, N. Y.—Samples of various sizes of Deco nitrogen-filled lamps were shown by this company together with illustrations of prominent buildings in which these lamps are used exclusively. One of the larger new buildings in New York equipped with Deco lamps is the Equitable Building.

DeVeau Telephone Manufacturing Company, New York, N. Y., displayed a line of telephone and signaling equipment including elevator anunciators, messenger calls and various push-button and signaling equipment. The company had numerous booths in the exhibit hall equipped with intercommunicating sets connected to its main exchange in its booth.

Eastern Flexible Conduit Company, Brooklyn, N. Y., showed samples of its non-metallic flexible conduit, armored cable and flexible-steel conduit.

Electrical Review and Western Electrician, Chicago, Ill., maintained reception headquarters where copies of the current issue were distributed. Among those in attendance were Charles W. Price, A. A. Gray, H. Ehrlich, E. E. Wood and F. A. Merkel.

Electric Storage Battery Company, Philadelphia, Pa.—Showed various sizes and types of storage batteries and storage-battery parts.

Hart Manufacturing Company, Hartford, Conn.—Had on display a complete line of "Diamond H" push-button switches and receptacles and various wiring devices. One of the interesting features of this exhibit was a 110-volt hospital signal system, pilot lamps replacing the customary buzzers. This signal system is used on the regular 110-volt lighting circuit and thus simplifies hospital wiring. Spartan interchangeable plugs and receptacles were also exhibited.

Hart & Hegeman Manufacturing Company, Hartford, Conn., exhibited a complete line of pipe taplets and covers, socket switches, rosettes, receptacles and other paiste devices used with pipe taplets. There was also shown brass shell and porcelain sockets and receptacles, attachment plugs, panel boxes, cutouts and other wiring devices.

Harvey Hubbell, Inc., Bridgeport, Conn., showed a full line of Hubbell plugs and receptacles, reflectors, lamp guards, McFadden lamps and switches and fittings.

Krantz Manufacturing Company, Brooklyn, N. Y., exhibited its safety auto-lock switch which makes it impossible to come in contact with live parts. The company takes considerable pride in having been awarded a gold medal by the American Museum of Safety.

National X-Ray Reflector Company, Chicago, Ill., showed its various types of reflectors for show-window lighting, industrial lighting and interior lighting. Flood lighting projectors, such as are used to light the Woolworth Building were also exhibited. In one corner of the exhibit space a large reflector was converted into a punch bowl and punch served to visitors.

Newton Manufacturing Company, Lynbrook, N. Y., showed a number of varieties of its new toggle switch. This is a new wall switch employing a lever movement instead of push buttons.

Luminous Unit Company, St. Louis, Mo., had a booth fitted up as a throne and lighted with a single Brascolite. A placard called attention of the visitors to the fact that the Brascolite was king of the night.

New York Gas & Electric Appliance Company, New York, N. Y., had a display of lamps and fixtures of various types suitable for use in stores, offices and homes.

Rubes Electrical Devices Company, Brooklyn, N. Y., exhibited its portable adjustable reel reading lamp and the new Rubes electromagnetic vibrator. The former has a removable base and can be used in any position. The base permits of attaching the lamp to various surfaces.

Sprague Electric Works, General Electric Company, had on display flexible steel-armored conductors, flexible steel conduit, stamped-steel boxes, electric fans, theater devices, controllers, lamps, switchboard panels and a complete line of wiring devices, fittings and tools.

Borden Company, Warren, O., showed its Beaver type, easy working die stocks and square-end pipe cutters. One of the latter was shown set up and in operation.

The Eureka Vacuum Cleaner Company, showed several types of electric vacuum cleaners and conducted demonstrations during the progress of the show.

Harter Manufacturing Company, Chicago, Ill., showed a line of electric lighting fixtures and specialties including industrial lighting units, clusters, covers and sockets for use on outlet boxes, bushings, lamp cords and fixture parts.

Hoover Suction Cleaner Company, showed its several types of electric cleaners both portable and stationary, and also exhibited a complete line of parts and fittings. Cleaners were shown in operation.

Trumbull Electric Manufacturing Company, Plainville, Conn., showed a complete line of combination switches, panel cutouts, plug cutouts and various wiring devices and fittings. A feature of the exhibit was the new "safety-first" panel boards having all live parts protected.

The Ward Leonard Electric Company, Mount Vernon, N. Y., showed its enameled resistance unit and other specialties.

Western Electric Company, New York, N. Y., had on display a complete line of its products which are of interest to electrical contractors. These included washing machines, fans, vacuum cleaners, lamps, small motors and various wiring devices and fittings.

Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa., conducted a display of current-consuming devices, wiring devices and fittings. Among the former were electric heating and cooking appliances, fans, washing machines, etc. Among the latter were shown switches, control apparatus, lamps, etc.

Standard Iron Works, New York, N. Y., showed a standard portable vise bench and pipe bender for use by contractors.

American Plaster Drill Company, New York, N. Y., showed its adjustable plaster drill for drilling in already built houses. It is used to cut plaster or wood ceilings or walls.

INDUSTRY ACTIVITIES

Terry Turbine Company, Hartford, Conn., has issued a folder on its duplex exciter sets.

Nordberg Manufacturing Company, Milwaukee, Wis., has issued a 36-page bulletin, No. 28, on poppet-valve engines.

Charles G. Robin announces that after August 1 he will occupy the entire store at 48 Warren Street, New York City, with a line of electrical supplies and also a complete line of fittings manufactured by himself.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has issued Leaflet 1356, on motors for driving ventilating and heating apparatus, and special publication No. 7046, on arc welding equipment.

The Robbins & Myers Company, Springfield, O., announces the removal of its branch office in Cincinnati, O., from 9 East Third Street to 821 Union Central Building. The warehouses will be retained at the old address—9 East Third Street.

Pawling & Harnischfeger Company, Milwaukee, Wis., is sending out a folder descriptive of and giving a list of users of "P. & H." single-line grab buckets. A return card for requesting Bulletin 101, which gives a full description of these buckets, is included.

Bleadon-Dunn Company, 208 North Fifth Avenue, Chicago, Ill., has issued a pamphlet showing the different uses of its Violetta electromedical instrument. These pamphlets, as well as an excellent photogravure for display purposes, are being furnished to dealers.

The Roller Smith Company, 233 Broadway, New York, has issued bulletin No. 300, which is devoted to a description of portable, direct-reading, slide-wire ohmmeters. These are made in two types; one known as the telephone type and one as the galvanometer type. Both instruments are fully described.

Mutual Electric & Machine Company, 232 West Fort Street, Detroit, Mich., manufacturer of switchboards, panelboards, cabinets, switches and cutouts, has opened a branch office in Chicago, Ill., at 627 West Jackson Boulevard, in charge of J. S. Jacobson, who is very well known to the electrical trade in the Chicago district. A complete stock of knife switches, cutouts, lugs and switchboard accessories will be carried in Chicago.

Sprague Electric Works of General Electric Company, 527 West Thirty-fourth Street, New York City, has issued Bulletin No. 48,706, on alternating-current, two and three-phase motors and controllers for flat-bed and small rotary printing presses; Bulletin No. 48,907, on type I-5, 500-pound electric hoists, and Bulletin No. 49,600, on flexible steel-armored conductors, flexible steel conduit, stamped steel boxes, fittings and tools.

New Battery Service Station Opened.—W. H. & Webster Jones Company, Springfield, Mass., has opened a new battery service station at 363-365 Worthington Street. The building is of two stories, 50 by 100 feet. The first floor is devoted to service work, the office and stock room. The second floor has the repair shop and charging room. There are 12 charging lines, each capable of carrying 15 six-volt batteries. Two motor-generator sets are operated, so arranged as to be run together or as separate units. All the wiring is carried in conduits, even on the charging tables. The room is lighted by large windows and two skylights. The concern carries over 200 storage batteries to rent to customers while theirs are laid up for repairs or for recharging. A full line of Willard batteries are on hand.

Victor Electrical Equipment Company, 248 Boylston Street, Boston, Mass., is distributing a folder on "Veeco" electric drives for talking machines.

Cutler-Hammer Manufacturing Company, Milwaukee, Wis., has issued a six-page folder on the new C-H candle-length socket. The folder points out that since the socket is furnished in one complete unit it eliminates the need for stocking, handling and assembling the various parts required for the usual candle fixture. The unit construction also makes the work of installing as easy as with the regular standard lamp socket. A phantom view of the candle-length socket illustrates the construction of the unit. Several other illustrations show the new socket installed on ceiling fixtures, wall brackets and small portables. One style of the socket with inlet in the side of the cap for conductors is shown installed on several solid pedestal portables. The extra inlet allows connection of conductors to socket from the outside and eliminates interior wiring. The company has issued a four-page folder describing the new C-H 7,700 line of "standard" interchangeable plugs and receptacles, which are referred to as "standard" because they are constructed on "standard" specifications agreed upon by six large manufacturers of electric wiring specialties. As a result it is pointed out that it is possible to interchange attaching caps on the plugs and receptacles made by the six companies. An exploded view of a C-H "standard" attachment plug shown in the folder illustrates the method of riveting the contact blades, which is made possible in the C-H plug because the thermoplax composition withstands the hammer blow incident to riveting. The contact blades, it is claimed, remain in permanent alinement since there are no screws to loosen.

Market for Electrical Appliances in Norway.—Owing to the large increase in the price of coal an increasing number of households in Norway are turning to electricity for domestic purposes, and the sales of electrical cooking and heating stoves, ranges, washing machines, irons, etc., have never been so heavy as at present. The demand for these articles is unprecedented and American manufacturers, while deriving much benefit from the changing conditions, could, with little effort, improve their position in this market. It is generally supposed that electric current in Norway is cheaper than in any other part of the world. It is also thought that coal will be expensive for a long time to come, and perhaps never return to its former price, for Norway depends entirely upon outside sources for its supplies. In any event the sale of electrical appliances is bound to continue to expand and when once installed and their many advantages recognized, few will care to return to the use of coal. Consul General E. H. Dennison, of Christiania, has recently been requested by one of the largest electrical dealers in Norway to furnish a list of American manufacturers of electrical appliances and would be glad to receive catalogs, price lists, and full particulars as to goods, terms of credit, etc., from American manufacturers who desire a good representative for Norway. The firm referred to desires the exclusive agency for the whole country in any lines it takes up and is already equipped to cover the whole country. The firm has a high standing and is able to develop a splendid business. Manufacturers who may be interested should send particulars at once to this consul general.

PERSONAL AND BIOGRAPHICAL

MR. C. L. PROCTOR, sales manager of the Empire District Electric Company, Joplin, Mo., has been elected president of the Joplin Advertising Club.

MR. DANIEL TALBOTT, formerly of North Middletown, Ky., has been appointed assistant manager of the Citizens Electric Light & Gas Company, of Indianapolis, Ind.

MR. A. P. SCHNEIDER, head of the power sales department of the Lehigh Valley Light & Power Company, Allentown, Pa., has resigned to become head of the Peters & Jacoby Company.

MR. LOUIS ENDER, manager of the Home Power Company, Skagway, Alaska, after three years' service with that company, has severed his connections to embark in business for himself.

MR. C. C. SIMONSON, manager of the Montana Power Company, at Lewiston, Mont., for the past six years, has been transferred to Billings, where he will serve as manager of the company's office in that city.

MR. CLEMENT C. SMITH, president of the Wisconsin Public Service Company, of Green Bay, and other Wisconsin holding companies, has been elected vice-president of the Baltimore Dry Docks & Shipbuilding Company, of Baltimore, Md.

MR. GEORGE R. MILLARD has been promoted to the position of assistant manager of the sales lighting department of the Lehigh Valley Light & Power Company, Allentown, Pa. He will devote his time especially to problems in the electric-heating and cooking fields. MR. H. W. LINDAMAN has taken Mr. Millard's position as manager of the company's office in Catasauqua, Pa.

MAJOR WILLIAM KELLEY, of the office of the United States chief of army engineers, is making a digest of material received in response to the call on all district engineers for reports on available hydroelectric sites in their districts for use by the United States Government nitrate factory. Major Kelley's digest will be presented to a special commission on nitrate production when that commission is appointed.

MR. E. A. BECHSTEIN, manager of the Sandusky Gas & Electric Company, Sandusky, O., has been elected president of the Ohio Electric Light Association. Mr. Bechstein's electrical work has been entirely confined to Sandusky, where he has been manager since 1906. He was born not far away, on Middle Bass Island, in Lake Erie, on November 15, 1872. He first entered the gas department of the Sandusky Gas & Electric Company, and later became foreman of electrical line work and house wiring. Mr. Bechstein has been active in the work of the Ohio Electric Light Association for many years, and he and Mrs. Bechstein have been regular attendants at the conventions. Mr. Bechstein has served upon a number of committees and has always done earnest work for the Association and has stood for progressive

E. A. Bechstein.

policies. This year he was chairman of the committee on general arrangements which did so much to make the convention the most successful of the long series which have been held at Cedar Point, adjacent to his home town.

MR. F. R. SLATER, who has for the last few months been acting as general manager for the Texas Power & Light Company, was officially chosen as vice-president and general manager of the company at a recent meeting of the board of directors. He was made acting general manager in January of this year, when MR. GEORGE S. HALEY resigned. Mr. Slater was born in Washington, D. C., in 1872. He received his college training at Cornell, graduating in 1894, and became a designing engineer for the Otis Elevator Company. During the Spanish-American War he was adjutant in the First United States Volunteer Engineers. In 1899 he entered the engineering department of the Manhattan Railway Company, of New York City, which was then converting its lines from steam to electric operation. Later he became a member of the engineering staff building the New York subway, being assistant engineer in charge of direct-current distribution, and later principal assistant engineer of the Interborough Rapid Transit Company. At the time of the St. Louis Exposition he served as a member of the advisory council of the Electric Railway Testing Commission. During 1907 Mr. Slater became identified with the firm of Latey & Slater, consulting engineers, withdrawing in 1912 to become general superintendent of the Texas Power & Light Company.

F. R. Slater.

OBITUARY.

SIR WILLIAM RAMSAY, noted for his discoveries in the field of chemistry and a recipient of the Nobel prize in 1904, died July 23 in London at the age of 63. His discoveries include argon, helium, crypton, neon and xenon. He was born in Glasgow and attended Glasgow Academy and the University of Glasgow, where he became a professor. In 1887 he accepted the chair of chemistry at University College, London, retiring as professor emeritus in 1913.

MR. H. S. MANNING, with the sales department of the Puget Sound Traction Light & Power Company, of Seattle, Wash., died in that city July 15, from an attack of spinal meningitis, aged 51 years. Mr. Manning had been with the Puget Sound Traction for 13 years. He was born at Salem, Mass., and was a graduate of the Massachusetts Institute of Technology. For several years he was connected with the General Electric Company at Chicago, Ill.

MR. C. W. H. KIRCHHOFF, for 36 years editor of *Iron Age*, a former president of the American Institute of Mining Engineers and a noted engineer, died July 22 at North Asbury Park, N. J., at the age of 64. Mr. Kirchhoff was born in San Francisco, Cal., and was educated in this country and Germany, graduating from the Royal School of Mines, Clansthal, Germany. He became connected with the *Metallurgical Review* in 1877, and later joined the staff of the *Iron Age*, leaving it for a time to be managing editor of the *Engineering and Mining Journal*, but returning in 1884. Four years later he became its editor-in-chief, and vice-president of the David Williams Company, publishers of the periodical.

MR. WILLIAM R. PATTERSON, of the firm of Patterson & Davidson, consulting engineers, died at his home in Chicago, Ill., July 19. Mr. Patterson was born in Effingham, N. H., in 1854. He was graduated from Dartmouth College in 1876 and in October, 1877, entered the employ of the Western Electric Company as paymaster. He became successively head of various departments. In connection with his electrical work he took out 85 patents, covering the several styles of lead-covered cable, both underground and aerial now in general use for telephone purposes all over the world. He was a director of the Western Electric Company and at the time of his death was senior partner of the firm of Patterson & Davidson. He is survived by a widow, one son and two daughters.

CURRENT ELECTRICAL NEWS

Weekly Record of Construction Activities

EASTERN STATES.

WORCESTER, MASS.—The Worcester Electric Light Company has begun installing the underground conduits and the power wires for a double row of ornamental poles and magnetite arc-lamps in Summer Street from Washington to Lincoln Square. The lighting fixtures will not be installed this summer because of lack of appropriations.

NEW BRITAIN, CONN.—The B. H. Hibbard Company, of this city, has been awarded the contract for erecting a new power plant for the North & Judd Manufacturing Company on Laurel Street. John A. Stevens, of Lowell, Mass., is the engineer.

NORWALK, CONN.—The Board of Electrical Commissioners has awarded a contract to the J. G. White Engineering Corporation, of New York City, for the designing, engineering and construction work in connection with extensions and improvements to the present electric light and power station located at South Norwalk, Conn.; also the installation of an ornamental street-lighting system in the second taxing district of Norwalk, Conn. Work is to begin immediately, and it is expected that the new lighting system will be in operation next autumn.

CHATHAM, N. Y.—The Public Service Commission has announced approval of several extensions of the electric lines of the Chatham Electric Light & Heat Company in Columbia County. The new lines will be in the towns of Chatham, Austerlitz, Claversack, Hillsdale, Taghkanic and Copake.

GLOVERSVILLE, N. Y.—The lighting committee of the Common Council is considering plans for the installation of an ornamental electric-lighting system here.

EAST ORANGE, N. J.—The City Council has authorized a bond issue for $16,500 for the purchase of fire-alarm cable and other apparatus.

LAMBERTVILLE, N. J.—The Board of Public Utility Commissioners has recommended improvements in the plant and equipment of the Lambertville Public Service Company to an amount of $25,000, prior to the issuance of new bonds for $170,000 for extensive additions to the generating system.

NEWARK, N. J.—The Public Service Electric Company will install new street lamps on Belleville Avenue from Broad Street to Bloomfield Avenue.

NEWARK, N. J.—The Board of Public Utility Commissioners has granted permission to the Public Service Electric Company and associate organizations to issue capital stock for $3,000,000 for existing obligations and extensions.

WASHINGTON'S CROSSING, N. J.—The Civic Association is planning for the installation of an electric system for street and residential lighting.

ALLENTOWN, PA.—The Borough Council has passed an ordinance granting the Lehigh Valley Light & Power Company permission to build a transmission line in certain streets of the borough. The privilege is granted for the extension of a line to Alburtis, where the company will install an electric-lighting system.

COLUMBIA, PA.—The A. M. Byers Company, manufacturer of wrought iron pipe, will equip its local plant for electric operation.

EDDYSTONE, PA.—The City Council is considering the installation of an electric street-lighting system, to replace the present gas lamps.

FALLSINGTON, PA.—About 40 property owners have signed a petition for the installation of an electric-lighting system here.

FORT WASHINGTON, PA.—Plans are being made for the extension of the street-lighting system in this city.

MONT ALTO, PA.—R. D. Sifton, general manager of the Waynesboro Electric Light & Power Company, has been discussing plans for street lighting with a committee of citizens here.

NORTHAMPTON, PA.—The Lehigh Valley Light & Power Company has been granted permission to operate a street-lighting system at Northampton Heights.

PHILADELPHIA, PA.—Hafleigh & Company, button manufacturers, have awarded a contract for the erection of a new power-house to Harry Brockelhurst.

PHILADELPHIA, PA.—Thomas Wolstenholme Sons & Company, manufacturers of worsted yarns, have awarded a contract for the erection of a new four-story, brick and steel power plant to A. L. Fretz & Son.

SHILLINGTON, PA.—The Berkshire Electric Company is planning for the installation of a local electric system. A franchise has been granted. The company will install a distributing system at Sinking Spring.

TITUSVILLE, PA.—Citizens here are discussing plans for a proposed white-way system.

BALTIMORE, MD.—The United Railways & Electric Company has awarded a contract to the West Construction Company, of Baltimore, for the construction of a transformer station on Belvedere Avenue to cost approximately $40,000.

BRIDGEWATER, N. C.—The Hardaway Contracting Company, Columbus, Ga., was the successful bidder for the construction of the dam and power plant to be erected by the Western Carolina Power Company in this city.

SARASOTA, FLA.—The West Coast Electric Railway Company proposes to build an electric railway south from Tampa, via Bradentown and Sarasota, thence to the east coast.

ST. PETERSBURG, FLA.—H. C. Case has been granted a franchise by the City Council to construct and operate an electric railway between Park Street and Seminole bridge, a distance of about two miles.

TAMPA, FLA.—The Florida Beach Development Company is considering plans for installing electric lights at Haven Beach on the Gulf at Indian Rocks.

TRILEY, FLA.—The stockholders of the Trilby Ice & Power Company have decided to change the name of the corporation to Trilby Ice & Packing Company, and to increase the capital stock from $20,000 to $300,000, so as to install the electric light and power department and the meat packing and cold storage departments, which will be started as soon as the material can be placed on the ground. W. M. Watkins is president.

NORTH CENTRAL STATES.

CLEVELAND, O.—Voters at the November election will be asked to approve a $1,750,000 bond issue for enlarging the municipal electric-lighting plant. Extensions have been recommended by Commissioner of Lighting Davis to take care of the power business of the Cleveland Railway Company.

DAYTON, O.—O. H. Hutchings, associate general manager of the Dayton Power & Light Company, has made the announcement that his company has recently placed large contracts for the construction of the tunnels, foundations and structural steel for the large power house that is being built at Miller's Ford, south of the city.

DELAWARE, O.—The holdings of the Delaware Electric Light, Heat & Power Company have been purchased by the National Utilities Company, of Poston, Mass. The former company was incorporated for $125,000, but the purchase price was over $160,000.

HAMILTON, O.—Plans are under way for special lighting of the fair grounds in celebration of the 125th anniversary of the city of Hamilton, during the week of August 21, at an estimated cost of about $2,300. The City Council has been asked to have the work done, and the Chamber of Commerce is pushing the matter.

IRONTON, O.—The County Commissioners have decided to install cluster lights in courthouse square, probably four standards with several lights each. The city will maintain the lights after installation by the county.

MASSILLON, O.—The City Council is contemplating action looking toward the installation of a boulevard lighting system on the principal streets of the city, replacing the present arc-lighting system. The installation will be paid for by assessments on property owners on the streets covered.

QUINCY, O.—Ways and means to secure an electric lighting system are being discussed here.

SOUTH ZANESVILLE, O.—The contract for lighting this city has been awarded to the Ohio Electric Railway Company, which has a plant in Zanesville. The company has agreed to furnish 28 100-candlepower lamps and four 250-candlepower lamps.

SULLIVAN, O.—A local electric plant, with distributing system to serve the town, will be constructed by the Sullivan Light & Power Company, recently incorporated here with a capital stock at $5,000.

YOUNGSTOWN, O.—In its application for a renewal of the franchise which it now holds, but has never exercised, the Mahoning County Light Company indicates its intention of constructing a plant to supply energy for light and power in the county, in competition with companies now furnishing similar service. The company at present has no plant in the county, but offers low rates if its franchise is extended and it is given the right to build one. The Council is considering the matter.

ANDERSON, IND.—At the regular meeting of the Board of Works, City Engineer Funk was instructed to prepare plans and specifications for a new addition to the boiler room of the municipal electric-lighting plant.

HEBRON, ILL.—A representative of the L. E. Myers Company called at the meeting of the Village Board and stated that the company was ready to accept the franchise as passed by the board and that it would make arrangements to extend its lines to this village at once.

JERSEYVILLE, ILL.—The light committee of the City Council has awarded the contract for installing the new white-way system in Jerseyville to the Central Illinois Public Service Company.

NEWTON, ILL.—The City Council has under consideration plans for purchasing a site and rebuilding and equipping the electric-lighting and water plants. An ordinance approved June 12 provides for a levy not to exceed $15,000 for that purpose.

SPRINGFIELD, ILL.—Petitions are being circulated for the installation of a boulevard lighting system on Capitol Avenue.

IRONWOOD, MICH.—The Ironwood and Bessemer Railway & Light Company is installing a 6,250-kilovolt-ampere steam turbine in its Bay Front station in Ashland, and is also installing a 3,000-kilowatt generating unit in its Superior Falls plant.

MT. PLEASANT, MICH.—The Hudson estate, of Detroit, has purchased the controlling interest in the Consolidated Light & Power Company and the Chippawa Construction Company. The company has been reorganized as the Central Michigan Light & Power Company with a capital of $50,000. The general offices will be located in Mt. Pleasant.

PAW PAW, MICH.—Plans are being made for the installation of a new ornamental street-lighting system.

IXONIA, WIS.—The Ixonia-Ashippun Electric Company of Milwaukee, organized to establish and operate an electric-lighting plant to furnish service to the villages of Ixonia and Ashippun, has filed articles of incorporation. The capital stock is $100,000 and the incorporators are E. C. Rosenberg, Philip Grossman and E. B. Kehoe.

MADISON, WIS.—The Wisconsin Railroad Commission has issued a stock and

bond approval of $3,000,000 to the Wisconsin Light, Heat & Power Company, which will consolidate several electric properties and construct transmission lines to points in southwestern Wisconsin.

MILWAUKEE, WIS.—Advertisements for material in connection with the construction of the municipal street-lighting distribution system will be published this week, according to Commissioner Simmons, who states that F. A. Vaughn, consulting engineer in charge, and the engineers of the new lighting bureau have proceeded with estimates sufficiently to enable him to determine what construction work will be done this year.

OCONOMOWOC, WIS.—At a recent meeting of the Common Council the offer of the Milwaukee Electric Railway & Light Company to supply energy to the city was discussed. The proposition will be considered at the fall election.

OMRO, WIS.—The Wisconsin Power, Light, Heat & Gas Company, a new corporation of which John I. Beggs, of Milwaukee, is president, has purchased the local electric-lighting plant formerly owned by John Challoner and the late R. H. Hackett, of this city.

RICE LAKE, WIS.—Arrangements have been completed whereby the Red Cedar Valley Electric Company of this city will dispose of its holdings to the Wisconsin-Minnesota Light & Power Company, of Eau Claire. Improvements in the local plant are contemplated.

KARLSTAD, MINN.—Bonds have been voted for an installation of an electric-lighting plant.

SANBORN, MINN.—The electric-lighting plant owned by Nordgren & Dahlgren recently was destroyed by fire.

ALBION, IOWA.—Based on the route that has been selected by the Iowa Railway & Light Company for a transmission line it will erect to supply energy for light and power to Albion, the company intends to supply towns along the Story City branch over a line to be erected in the right of way of the Minneapolis & St. Louis Railway.

CRESTON, IOWA.—The Creston Mutual Electric Light & Heat Company, G. C. Cornelius, manager, will construct a transmission line to Orient, a distance of eight miles, and furnish electric service there.

WASHINGTON, IOWA.—The Council is planning to establish a municipal electric-lighting plant.

KANSAS CITY, MO.—W. E. Winner and W. A. Rule are interested in a project to buy the Leavenworth & Topeka Railroad, a steam road between Topeka and Leavenworth now in the hands of receivers, and convert it into an electric line. It would probably be made to serve as part of a system contemplated by Mr. Winner, of which one feature is a line northward and eastward from Kansas City to Iowa. Mr. Winner's Tiffany Springs electric line is now being constructed.

ST. LOUIS, MO.—The United Railways is rushing the construction work on its new substation in Kirkwood, which was commenced in May. The electrical equipment will consist of a 600-kilowatt rotary converter, with air-blast transformers and other equipment to be taken from the Brentwood substation. The ultimate capacity of the station will be two 1,000-kilowatt converters, the building being designed for the installation of 600-kilowatt units as well. The switchboard will accommodate one alternating-current line, two rotary converters, portable converter and three direct-current feeder sections. This substation will be fed from the Brentwood substation by means of a 13,200-volt line recently completed.

BISON, KANS.—This city is making plans to obtain electrical energy for street lighting from the city of LaCrosse.

CUNNINGHAM, KANS.—The Council is considering the proposition for establishing an electric-lighting system here. C. E. Wetherall, of this city, has asked for a franchise.

FORT SCOTT, KANS.—A bond issue for the erection of a municipal electric-lighting plant will be considered by voters here.

HANOVER, KANS.—Plans are being considered here for the extension of the street-lighting system.

HUTCHINSON, KANS.—The city has made a new street-lighting contract for 10 years with the United Water, Gas & Electric Company, which includes 48 additional four-light posts.

IOLA, KANS.—A number of extensions to the white-way system are under consideration.

JENNINGS, KANS.—The question of issuing $20,000 for the erection of transmission and distribution systems here will be considered by the voters at an election to be held soon.

DATES AHEAD.

International Association of Municipal Electricians. Annual convention, Baltimore, Md., August 22-25. Secretary, C. R. George, Houston, Tex.

Association of Edison Illuminating Companies. Annual convention. Hot Springs, Va., September 4-7. Secretary, George C. Holberton, San Francisco, Cal.

Pennsylvania Electric Association. Annual convention, Eagles Mere, Pa., September 5-8. Secretary, H. N. Muller, Duquesne Light Company, Pittsburgh, Pa.

American Institute of Electrical Engineers. Pacific Coast convention, Seattle, Wash., September 5-8. Secretary, F. L. Hutchinson, 29 West Thirty-ninth Street, New York City.

Illuminating Engineering Society. Annual convention, Philadelphia, Pa., September 18-21. Assistant secretary, C. D. Fawcett, 29 West Thirty-ninth St., New York City.

Association of Iron and Steel Electrical Engineers. Annual convention, Chicago, Ill., September 18-22. Secretary, W. O. Oschmann, Oliver Steel & Foundry Company, Pittsburgh, Pa.

American Electrochemical Society. Semi-annual meeting, New York City, September 28-30. Secretary, J. W. Richards, South Bethlehem, Pa.

New England Section, N. E. L. A. Annual convention, Pittsfield, Mass., October 17-20. Secretary, O. A. Bursiel, 149 Tremont Street, Boston, Mass.

Telephone Pioneers of America. Annual meeting, Atlanta, Ga., October 19-20. Secretary, R. H. Starrett, 15 Dey Street, New York City.

KANSAS CITY, KANS.—The local water and light department has made an arrangement with the Home and the Bell telephone companies in this city whereby all unnecessary poles will be eliminated from the streets and alleys. Each telephone company and the city light department will use the best poles in any location, paying rental to the owner who shall maintain them, and the unused poles shall be removed. It is estimated that nearly 7,000 poles will be removed under this agreement.

STERLING, KANS.—Bonds in the sum of $75,000 have been voted for the purchase of the local electric-lighting plant, which was owned by George A. Morris.

ALCESTER, S. D.—Plans have been completed for a transmission line from Haywarden to this city, a distance of eight miles. E. D. Jackson, 601 Capital Bank Building, St. Paul, Minn., is the engineer.

CLARK, S. D.—The City Council will call a special election and submit to the voters the question of authorizing bonds in the sum of $16,000 for the erection of a municipal electric-lighting system.

NORTHVILLE, S. D.—An election will be held to vote on the question of issuing $5,000 in bonds, the proceeds to be used for establishing an electric-lighting plant.

WINNER, S. D.—The Winner Light & Power Company has been incorporated with a capital of $25,000 by E. L. Snyder, W. J. McFadden and C. P. Kilbourbe, of Sioux City, and C. Maule, of Winner, to furnish electric service here.

SOUTH CENTRAL STATES.

LOUISVILLE, KY.—The Brinley-Hardy Company, plow and implement manufacturer, Louisville, is contemplating changing from direct to alternating current. Motors would be bought and central-station service used.

ARKADELPHIA, ARK.—The Arkansas Light & Power Company, of this city, is extending its transmission line from Morrilton to Plummerville, several miles distant.

BATESVILLE, ARK.—Business men on State Street are planning the installation of a white-way system.

GILLHAM, ARK.—An electric-lighting plant is to be built in this city. W. A. Burr is interested.

KENNER, LA.—Mayor Felix has appointed a committee for the purpose of making plans for securing electric service here.

BLACKWELL, OKLA.—George W. Knox, vice-president and general manager of the Oklahoma Railway Company, has asked the city of Blackwell for a franchise to build and operate a street railway in this city. An election to vote on the proposition will be called.

CHICKASHA, OKLA.—The Chickasha Gas & Electric Company is now taking contracts in Verden, ten miles northwest of here, for wiring the residences and business houses of that city for electric service. A 6,600-volt, three-phase transmission line will connect the two cities and 24-hour service will be given. One hundred contracts have been received and 50 more are expected to be signed up within the week. In addition to the private lighting, Verden will have 18 street lights. The line will cost $10,000 and the company is now spending $5,000 improving its system in Chickasha. New lines are being built and a new cofferdam is being put in at the power plant and a new switchboard for the water power plant.

MUSKOGEE, OKLA.—It is reported that the Muskogee Traction Company is planning to construct a power plant for the operation of its system. The company now purchases energy from the Muskogee Gas & Electric Company, and operates 31 miles of railway between Bacone, Muskogee and Fort Gibson. The proposed plant will develop from 500 to 700 horsepower and will cost approximately $100,000.

CLEBURNE, TEX.—The Cleburne Traction Company, under new management, has resumed operation of the street cars in Cleburne.

DALLAS, TEX.—Prospects for the early completion of the electric power line being built from Jenkins to Commerce by the Texas Power & Light Company are very good. Work on all the substations for this line is progressing rapidly and the construction necessary for supplying service to power customers will be completed on schedule time.

HASKELL, TEX.—The Haskell Ice & Light Company is making important extensions of its electric power transmission system to towns of this section. It has just finished building lines to Knox City, Goree and Munday and will make further extensions with the view of reaching all the towns within a radius of about 100 miles of here.

HOUSTON, TEX.—It is reported that the Houston, Richmond & Western Traction Company will award the contract for the construction of a power plant. The company proposes to construct an electric railway from Houston to San Antonio.

JACKSONVILLE, TEX.—R. W. Baker, manager of the water and ice company at Palestine, Tex., together with the New York interests that he represents, have purchased the local ice and electric-lighting plants.

MARLIN, TEX.—The Marlin-Temple Interurban has been incorporated with principal office here for the purpose of constructing and operating an interurban electric railway between Marlin and Temple, a distance of about 35 miles. The incorporators are G. W. Glass, S. D. Hanna, William Ginmuth, George Houston, E. W. Moore and others. The project involves the building of an electric power station.

ROCKDALE, TEX.—The Texas Power & Light Company has made arrangements to purchase the electric plant at Rockdale, and in the future will furnish electricity for this town by means of a line to be built from Thorndale.

TERRELL, TEX.—The City Council is negotiating with the Texas Power & Light Company, of Dallas, with the view of selling the municipal electric-light and power plant to that company and the purchase of electric energy from the latter's transmission line.

WOLFE CITY, TEX.—The Texas Power & Light Company has purchased the local electric-lighting plant and will begin operating the electric property in this town as soon as the high-tension power line which is being built from Jenkins to Commerce is completed.

WESTERN STATES.

ANACONDA, MONT.—A resolution has been passed by the City Council creating a special lighting district to install an ornamental lighting system on West Broadway, from Idaho to Emmett Streets.

BUTTE, MONT.—A resolution creating a new ornamental lighting district on West Broadway is now being prepared by City Engineer J. J. Armstrong and will come before the next meeting of the City Council. The new lights will be a continuation of the downtown lighting system.

BUTTE, MONT.—Plans for the construction of a 100,000-volt transmission line

from Lewistown to Twodot and thence to Harlowton are being prepared by the Montana Power Company, and it is reported the installation, including the construction of a substation at Harlowton, will be made at an early date.

PHOENIX, ARIZ.—The South Side Gas & Electric Company has offered to sell its entire holdings to the city.

PHOENIX, ARIZ.—The Pacific Gas & Electric Company has agreed to lower its rates for electrical energy in Phoenix if it is able to make a new contract for power from the plant of the United States Reclamation Service. If this contract is not negotiated the company plans to provide its own electricity.

PIMA, ARIZ.—The local electric-lighting plant has been sold by D. H. Welch to his two sons.

NEWPORT, WASH.—The Northern Idaho & Montana Power Company is preparing to erect a transmission line from its substation in this city to Dalkena.

NORTH YAKIMA, WASH.—According to reports, the Pacific Power & Light Company of Portland, Ore., has instructed its engineering department to prepare plans for the construction of several steel substations to be built in this section of the country. The company supplies current for both lighting and power to a number of municipalities in Eastern Washington.

SEATTLE, WASH.—The Hebb power site on the White River, which has been offered to the city of Seattle many times for $1,000,000, by P. H. Hebb, owner, was recently offered to the city for $250,000. This site was recently reinspected by a special committee, composed of City Engineer A. H. Dimock, former City Engineer R. H. Thomson and Superintendent of Lighting J. D. Ross. This committee has been detailed by the Council to look for a site that can be developed for low first cost. The committee has inspected the Lake Cushman, Peckwood Lake, Skykomish River, White River and Elwha projects and has reported favorably on several of these. Superintendent Ross advised the Council, some time ago, that steps must be taken in the immediate future to secure additional power as an adjunct to the present municipal plant, which is inadequate to supply the increasing needs of the municipality.

SPOKANE, WASH.—About $3,500 damage was done to the plant of the Union Iron Works here recently when it was struck by a severe lightning storm, damaging the motors, transformers and other electrical equipment.

MARSHFIELD, ORE.—According to reports, a new scheme of city lighting is to be presented to the City Council in the immediate future. The proposal is that the city take over the cluster lighting system, while the power company will install a new system of street lights. The city would pay for the cluster lighting and instead of having lights at alternate corners throughout the city, as now, lights would be installed on every corner where the lighting extends.

FALL RIVER MILLS, CAL.—The electric system of the California Power & Manufacturing Company is now in full operation. The company has 14 miles of transmission line and is operating seven pumps and its flour mill with electricity.

LINDSAY, CAL.—Officials of the Bisalia Electric have announced that work on the branch from Exeter to Lindsay will commence in about two weeks. O. J. Cohen has arrived to take charge of the local office.

LONG BEACH, CAL.—The Pacific Telephone & Telegraph Company plans to spend about $24,000 in improvements to its system in this vicinity.

LOS ANGELES, CAL.—The City Council has ordered the installation of an electric-lighting system on Sixth Street between Palos Verdes Street and Pacific Avenue in San Pedro, also on Hobart Boulevard between Washington and Adams Streets.

PRATTVILLE, CAL.—Engineers of the Great Western Power Company are running lines for the system of canals and tunnels to connect the Nevis Dam at a point near here with a proposed power plant at the mouth of Yellow Creek.

RIVERSIDE, CAL.—The Supervisors of Riverside County will receive bids up to August 9 for a 50-year franchise along the highways of the county, applied for by the Southern Sierras Power Company.

SAN BERNARDINO, CAL.—The Southern Sierras Power Company has applied for a 50-year franchise over the public highways of San Bernardino County and the Supervisors of the county will receive sealed bids for such a franchise up to August 14.

SAN FRANCISCO, CAL.—Dr. H. B. Cox, after five months' work with the United States Forest Service, near Los Olives, demonstrating the practicability of a wireless system of signals for forest fires, has announced the perfection of a subterranean wireless telephone. He has gone east to obtain patents.

SAN FRANCISCO, CAL.—The Pacific Gas & Electric Company has offered the Park Commissioners to furnish 110 arc lamps of 250 candlepower along the main drive of Golden Gate Park from Stanyon Street to the beach, three miles, at a cost of 13c per lamp per night. The posts are to be ornamental and 12 feet high. All wires will be underground. The Supervisors appropriate $5,000 annually for the lighting of the park.

WATTS, CAL.—The City Trustees have ordered the installation of ornamental electroliers on Melvin Avenue between Shorb Avenue and Main Street.

WOODLAND, CAL.—The Supervisors of Yolo County have granted the Northern California Power Company a franchise to operate in any part of the county exclusive of incorporated towns.

CANADA.

ANYOX, B. C.—The Taylor Engineering Company, of Vancouver, B. C., has been awarded the contract for the construction of an auxiliary steam power plant of 7,000 horsepower capacity for the Granby Consolidated Mining, Smelting & Power Company at Anyox. The plant, according to estimates, will cost about $700,000.

ROSSLAND, B. C.—The West Kootenai Power & Light Company will install an 8,000-horsepower unit to its plant at Upper Bonnington Falls, B. C., bringing the capacity of the Bonnington Falls plant up to 32,000 horsepower, and the company's total capacity at Bonnington and Cascade to 39,000 horsepower. The company is enjoying an enormous business from the development of mines and smelters in this section of British Columbia.

New Incorporations

CLEVELAND, O.—Wicks Electric Company has increased its capital from $10,000 to $25,000.

BOSTON, MASS.—Foster-McDonald Company. Capital, $50,000. Manufacture electrical supplies. Incorporators: Almon Foster, A. R. McDonald and G. L. Weeks.

DUCHESNE, UTAH.—Duchesne Power Company. Capital, $25,000. Incorporators: J. S. Dean, of Topeka, Kans.; W. H. Cammerer, W. L. Dean, T. W. Sweatman and M. B. Pope.

EAST ORANGE, N. J.—Motor Compress Sales Corporation. Capital, $125,000. Manufacture electrical and mechanical self-starters. Incorporators: C. O. Geyer, F. R. Smith and Gordon Grand.

LACONIA, N. H.—Esty Machine Company. Capital, $100,000. Manufacture machinery, operate water rights and generate electricity. Incorporators: William Esty, G. W. Shurwell, F. F. Taylor and others.

DOVER, DEL.—Electric Standard Railways of Williamsport, Pa. Capital, $1,000,000. Construct and operate electric railways. Incorporators: G. L. Campbell, H. R. Noll and H. W. Lukens, all of Williamsport.

SPOKANS, WASH.—Spokane Heat, Light & Power Company. Capital, $2,000,000. Incorporators: H. A. Flood, H. B. Harris and R. J. Dauson, of Spokane, and R. E. Field and A. H. Richards, of Cincinnati, O.

Proposals

WIRING SYSTEM.—Sealed proposals will be received by the Supervising Architect's Office, Treasury Department, Washington, D. C., until August 8 for a conduit and wiring system, lighting fixtures, etc., for the United States post office at Paterson, N. J. See proposal columns for details.

ELECTRIC DISTRIBUTION SYSTEM.—Bids will be received until August 1 for an electric distribution system for the town of Albany, Ill., estimated to cost $3,500. Plans and specifications may be obtained upon deposit of $10 from D. G. Fisher & Company, engineers, 212 Whitake Building, Davenport, Iowa.

FIRE-ALARM, WATCHMAN'S CLOCK AND TELEPHONE SYSTEMS.—Sealed proposals will be received by the Supervising Architect's Office, Treasury Department, Washington, D. C., until August 14 for a combination fire-alarm, watchman's clock and telephone system in the building, Interior Department offices, Washington, D. C. See proposal columns for details.

ELECTRIC-LIGHTING SYSTEM.—Sealed bids will be received August 3 for the construction of an electric-lighting system at Hartland, Minn. The work is divided into three parts: part 1, consisting of a brick building; part 2, consisting of furnishing and erecting oil engines, generators and switchboard, and part 3, electrical distribution system. Bids will be received on complete parts only. J. A. Halvorsen, Village Recorder.

MOTOR-DRIVEN EXHAUST FANS.—Sealed proposals will be received August 3 at Room 406 City Hall, Chicago, Ill., for furnishing and delivering to the administration building of the Marshall Boulevard municipal plant, seven exhaust fans and direct-connected motors, with speed control, controller box and motor support, according to plans and specifications on file in the office of the Department of Public Works. W. R. Moorhouse, Commissioner of Public Works.

Financial Notes

The directors of the Pacific Gas & Electric Company will meet July 31 to declare the regular quarterly dividend of $1.50 per share on preferred capital stock, such dividend being payable on August 15.

At a meeting of the board of directors of the Kings County Electric Light & Power Company, held July 16, a regular quarterly dividend of two per cent was declared on the amount of capital stock outstanding, payable September 1 to holders of record at 3 p. m., August 21.

The California Railroad Commission has authorized the Fresno Interurban Railway Company, constructing a line between Fresno and Sanger Road, to issue $149,700 of first-mortgage six-per-cent 25-year bonds, $10,936 face value of notes, and $8,100 par value of capital stock. The bonds authorized are only to be issued on the cancellation of a like amount of first-mortgage six-per-cent 10-year bonds now outstanding.

The California Railroad Commission has been hearing the application of the Nevada-California-Oregon Telegraph Company for permission to sell $15,000 of its first-mortgage 40-year six-per-cent sinking fund gold bonds at 80, and to use the proceeds in new construction in California. Out of a total authorized issue of $300,000 of these bonds, the company has already sold $55,000 and has expended the proceeds in building its lines.

Cities Service Company has offered to buy the stock of the Lincoln (Neb.) Gas

CLOSING BID PRICES FOR ELECTRICAL SECURITIES ON THE LEADING EXCHANGES AS COMPARED WITH THE PREVIOUS WEEK.

	July 24	July 17
American Tel. & Tel. (New York)	129⅛	129⅛
Commonwealth Edison (Chicago)	145	145
Edison Electric Illuminating (Boston)	237½	236½
Electric Storage Battery common (Philadelphia)	62½	62½
Electric Storage Battery preferred (Philadelphia)	62½	62½
General Electric (New York)	168½	164
Kings County Electric (New York)	130	130
Massachusetts Electric common (Boston)	5½	5½
Massachusetts Electric preferred (Boston)	33	32⅛
National Carbon common (Chicago)	170	168
National Carbon preferred (Chicago)	121	121
New England Telephone (Boston)	134	133½
Philadelphia Electric (Philadelphia)	28⅞	28⅞
Postal Telegraph & Cables common (New York)	82	82½
Postal Telegraph & Cables preferred (New York)	67½	67½
Western Union (New York)	93	93
Westinghouse common (New York)	57¾	54½
Westinghouse preferred (New York)	68	65

& Electric Light Company, offering to exchange for each Lincoln share 35-100 of a share of Cities Service preferred stock and 7-100 of a share of common stock. This privilege will extend until August 1, 1916. Cities Service Company has also offered to buy all outstanding preferred stock of the Electric Bond Deposit Company, exchanging one share of Cities Service preferred for each share of Electric Bond Deposit preferred. The exchange privilege also extends until August 1, and in both cases is contingent upon the assent of the holders of 75 per cent of the stock in the company.

Stockholders of the Western Canada Power Company have approved the plan submitted by the reorganization committee for the reconstruction of the company and the refinancing will be carried out as soon as possible. It is understood that the noteholders' committee has secured the formation of a syndicate in New York which will underwrite an issue of not less than $850,000 preferred stock, and the protective committee will offer this preferred stock to holders of the notes and the stock at $80 a share. President C. H. Cahan in a statement to the stockholders said that there is a growing feeling of confidence that there will be a steady upbuilding of trade in Vancouver and British Columbia and that the Pacific Ocean trade is destined to become exceedingly large.

Readjustment of the Philadelphia Electric Company's finances calls for the issuance of $35,000,000 of first-mortgage five-per-cent bonds. A syndicate being formed to underwrite the issue includes Chandler & Company, Inc., and Drexel & Company, of Philadelphia. The loans will be offered to the public. Under the mortgage it is expected about $50,000,000 of bonds will be authorized. Of the $35,000,000 about $28,600,000 will be used to exchange for $15,014,000 Philadelphia Electric four-per-cent collateral trust, due in 1949, $11,268,000 five-per-cent trust certificates, due in 1948, and $2,294,000 indebtedness of two subsidiaries. The $7,000,000 balance will be used for capital requirements, including extension of its light service, additions to its power service—the company supplies power to the Philadelphia Rapid Transit Company and the Pennsylvania Railroad—and new construction in connection with proposed underground lines.

Dividends.

	Term.	Rate.	Payable.
Am. Rys., pf.	Q	1.75%	Aug. 15
Brazilian Trac., Lt. & Pw., com.	Q	1 %	Sept. 1
Conn. Ry. & Lt.	Q	1 %	Aug. 15
Conn. Ry. & Lt.	Q	1 %	Nov. 15
Edison Co., Brockton	Q	$2.00	Aug. 1
Illum. & Pw. Sec., pf.	Q	1.75%	Aug. 15
Kaministiquia Pw.	Q	1.75%	Aug. 15
Kings Co. Elec. Lt. & Pw.	Q	2 %	Sept. 1
Lewiston, Augusta & W. St. Ry., pf.	Q	1.5 %	Aug. 1
Lowell Elec. Lt. Corp.	Q	$2.50	Aug. 1
Manhattan Elec. Sup.	S	3 %	Aug. 7
Manhattan Elec. Sup., pf.	S	3 %	Aug. 7
Manhattan Elec. Sup., ex.—		3 %	Aug. 7
Pacific Pw. & Lt., Portland, pf.	Q	1.75%	Aug. 1

Electrical Patents Issued July 11, 1916

Prepared by Thomas Howe, Patent Attorney, 2 Rector Street, New York, N. Y.

1,190,259. Telegraph Key. R. M. Allen, assignor to Western Electric Co., New York, N. Y. Has vibrator for sending dots.

1,190,286. Insulator. E. Harlan, Fresno, Cal. Pin type.

1,190,289. Electric Water-Heater. A. Herz, Chicago, Ill. For attachment to tank.

1,190,291. Method of and Apparatus for Varying the Speed of Electric Meters on Reversal of Current Flow. J. H. Hodde, assignor to Sangamo Electric Co., Springfield, Ill. For indicating capacity of charge for storage battery.

1,190,295. Automatic Gas Lighter. B. F. Keith, Belton, Tex., assignor of one-third to T. S. Lovette, Belton, Tex. Electric jump-spark.

1,190,297. Lighting System for Electrically Propelled Vehicles. D. Kinniburgh, Chicago, Ill. Has switch controlled by trolley pole.

1,190,298. Speed Indicator. F. S. Kirk, Enid, Okla. Movement of pointer successively lights lamps.

1,190,304. Ampere-Hour Meter. R. C. Lanphier, assignor to Sangamo Electric Co., Springfield, Ill. For indicating effective capacity of storage battery.

1,190,308. Incandescent-Lamp Socket. R. M. Levy, New York, N. Y. For series connection.

1,190,332. Electric Sound-Producer. M. L. Severy, Arlington Heights, Mass. Musical instrument has electromagnetically operated diaphragm controlled by variation of fluid resistance.

1,190,359. Electric Switch. C. J. Zigler, and W. P. Holden, Chicago, Ill. Mounting of blades on rotatable, insulating cylinder.

1,190,366. Automatic Circuit-Controller. R. D. Ashley, Oakland, Cal. Circuit-controlling system has normal energy and auxiliary restoring circuit.

1,190,379. Motor and Exhaust Appliance for Piano-Players. M. Clark, assignor to Melville Clark Piano Co., Chicago, Ill. Electric-motor driven; for grand pianos.

1,190,394. Locomotive with Haulage-Cable Mechanism. D. T. Fisher, assignor to Jeffery Mfg. Co., Columbus, O. Has two motors, one driving wheels and other the reel for haulage cable.

1,190,405. Battery Box. C. M. Hattenberger, Kettle River, Minn. Special connecting arrangements in cover.

1,190,412. Electrode for Devices for Varying Electrical Resistance. W. G. Hudson, assignor to Radio Telephone & Telegraph Co., New York, N. Y. Tungsten filament covered with tantalum.

1,190,459. Illuminating Sign. L. G. Randolph, Chicago, Ill. Translucent tube forming sign letters alternately filled with and emptied of opaque fluid.

1,190,481. Electrical Transformer. G. W. Terhorst, assignor to Pittsburgh Transformer Co., Pittsburgh, Pa. Structure of laminated core.

1,190,485. Electric Meter. M. E. Turner, Cleveland, O. Maximum demand.

1,190,490. Electrotherapeutic Apparatus. W. L. Walter, Pueblo, Colo. Arrangement of interrupters, condenser, etc.

1,190,496. Centrifugal Speed-Regulator for Dynamos. P. B. Whitney, assignor to Mesinger-Whitney Electric Co., New York, N. Y. Centrifugally controlled driving clutch.

1,190,498. Diffusion Lens for Electric Signs and the Like. H. S. Williams, assignor to D. G. Hunt, Salt Lake City, Utah. Special details including reflector.

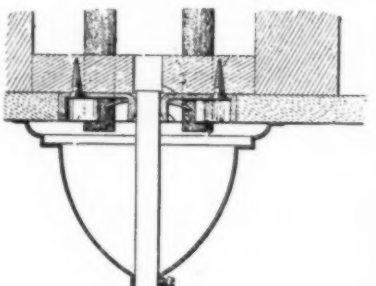
1,190,509. Electric Train-Wire Coupling. T. R. Brown, assignor to Westinghouse Air Brake Co., Wilmerding, Pa. Connection between coupling heads controlled by solenoid.

1,190,520. Train-Signaling and Controlling System. C. S. Currier, Pontiac, Mich. Vehicle-carried train-controller operated by train-controlled track obstacle.

1,190,524 and 1,190,525. Terminal Connector. H. A. Douglas, assignor to Douglas & Rudd Mfg. Co., Bronson, Mich. Details of plug and socket couplings.

1,190,526. Electrical Contact Device for Train Couplings. V. S. Durbin, assignor to Durbin Automatic Train Pipe Connector Co., St. Louis, Mo. Mounted on coupler heads.

1,190,534. Trolley-Replacer. H. H. Fisher and W. C. Barnes, Evansville, Ind. Slidable on pole and in normally retracted position is released by striking trolley.



No. 1,190,664.—Outlet Box.

1,190,548. Telephone Receiver. W. W. Henry, assignor to S. H. Couch Co., Atlantic, Mass. On curved arm slidable in wall plate.

1,190,585. Damper-Operating Mechanism. R. Roberts, Forest City, Pa. For stoves; operating weight governed by time-controlled circuit.

1,190,588. Relay. W. E. Rogers, Trenton, Mich. Armature has weight and spring contact retarding opening.

1,190,595. Rotary Valve for Explosive Engines. G. L. Schofield, Kansas City, Mo. Special combination with spark plug.

1,190,608. Buzzer. R. I. Utter, assignor to Kellogg Switchboard and Supply Co., Chicago, Ill. On attraction of armature chain is slackened, inserting resistance in circuit instead of breaking it.

1,190,609. Apparatus for the Sterilization of Liquids by Ultra-Violet Rays. M. Von Recklinghausen, assignor to the R. U. V. Co., New York, N. Y. Details of structure.

1,190,610. Welding. J. G. Wallace, assignor to Hale & Kilburn Co., Philadelphia, Pa. Plates secured to wooden spacing strip by rods through strip welded to plates.

1,190,613. Automatic Electric Block-Signaling Apparatus for Railroads. F. C. Williams, assignor to Safety Block Signaling Co., Philadelphia, Pa. Train stopped on failure of signal.

1,190,614. Mechanism for Stopping Marine Vessels. F. C. Williams, Philadelphia, Pa. Controls propelling mechanism in vicinity of icebergs.

1,190,617. Device for Preventing Collisions Between Railway Trains. A. R. Angus, New South Wales, Australia. Block system.

1,190,621. Break Switch. G. E. Barstow, assignor to Thomson Electric Welding Co., Lynn, Mass. For breaking large current circuits such as used in welding.

1,190,625. Telegraph Key. W. A. Boyd, assignor to Western Electric Co., New York, N. Y. Has vibrator for sending dots.

1,190,641. Connection for Electric Conduits. E. E. Greaves, assignor to Crouse-Hinds Co., Syracuse, N. Y. Threaded connection made secure.

1,190,647. Electromagnet. E. Hedenskoog, assignor to Brunswick-Balke-Collender Co., Chicago, Ill. Equal distribution of flux over face at end of core.

1,190,664. Outlet Box. J. T. Meleady, Newark, N. J. Has spring grip for ends of conduit. (See cut.)

1,190,680. Arrangement for Excitation of Continuous-Current Generators. L. Schon, assignor to Fried, Krupp, Aktiengesellschaft, Essen-on-the-Ruhr, Germany. Applicable to machines having two main brushes and auxiliary brush.

1,190,685. Permutation Switch Lock. E. C. Leachout and E. L. Harrison, Flint, Mich. Movement of plunger switch controlled by combination lock.

1,190,697. Apparatus for Thermohumidity Control. F. D. Windell, Philadelphia, Pa., assignor of one-half to H. L. Williams, Pittsburgh, Pa. Certain temperature and humidity maintained in each of number of compartments independently of others.

1,190,699. Means for Promoting Vegetation. W. J. Anson, Los Angeles, Cal. Arrangement of conductors in tile sections in soil.

1,190,727. Circuit-Closing Combination Alarm-Clock. J. E. Christie, Salt Lake City, Utah. Operated by combination operation of number of push buttons.

1,190,730. Electric Lamp. J. L. Corcoran, assignor to Corcoran Victor Co., Cincinnati, O. Socket and connections for battery lamp.

1,190,750. Plug. C. E. Godley, assignor to Edmund & Jones Corporation, New York, N. Y. For receiving lamp bulb.

1,190,763. Insulator Clamp. E. G. Hatch, assignor to Clark Electric & Mfg. Co., New York, N. Y. For clamping about conductor and neck of insulator.

1,190,766. Insulating Support. A. S. Hubbard, New York, assignor to Gould Storage Battery Co., New York, N. Y. For supporting storage battery or other downward acting load.

1,190,769. Apparatus for Treating Liquid. B. Jurist, assignor to Eryer H. Pendry, New York, N. Y. Ultra-violet ray apparatus.

1,190,773. Electric Cartridge Fuse. W. R. Koen, Flat River, Mo. Manner of securing fuse to end caps.

1,190,780. Electric Heater. J. M. McElroy, Albany, N. Y., assignor to Consolidated Car-Heating Co. Regulation of heating system in which fan blows air over heating coils.

1,190,785. Ignition Dynamo. C. T. Mason, assignor to Splitdorf Electric Co.,

Newark, N. J. Unitary structure including circuit-breaker.

1,190,801. **Machine for Winding Armatures for Dynamoelectric Machines.** K. R. Ritter, Leipzig Schonefeld, Germany. Type in which armature holder and wire spool rotated about axis perpendicular to armature shaft.

1,190,813. **Telephone-Transmitter.** N. Tanaka, New York, N. Y. Diaphragm vibrates bodily.

1,190,814. **Insulating Composition and Process of Producing It.** H. C. Tazewell, Wilmington, Del. Of creosote oil, shellac and alum; can be molded, cast and melted off by blow-torch.

1,190,815. **Plastic Composition and Process of Making It.** H. C. Tazewell. Above is lightened by adding magnesium carbonate and made to set more effectively by adding hydrated lime.

1,190,820. **Electrically Operative Calendar Device.** G. N. Tsumura, Mountain View, Cal. Clock-controlled.

1,190,823. **Tripping Mechanism for Igniters.** H. R. Van Deventer, assignor to Splitdorf Electrical Co., Newark, N. J. For operating oscillating magneto and igniter for engines.

1,190,836. **Combination Pothead and Series Cutout.** P. F. Williams, assignor to G. & W. Electric Specialty Co., Chicago, Ill. Structural details.

1,190,839. **Speed-Controller.** J. G. Aceves, New York, N. Y. Steam-turbine valves actuated by electromagnets controlled by pilot motor.

1,190,845. **Process for Organic Synthesis.** L. H. Baekeland, Yonkers, and A. H. Peter, New York, N. Y. Electrolytic method of making tartaric acid.

1,190,846. **Spark-Plug.** J. W. Baird, Chicago, Ill. Central electrode is oscillatory bar.

1,190,856. **Electric Furnace.** J. W. Brown, assignor to National Carbon Co., Cleveland, O. Charge containing furnace units are successively moved between the electrodes.

1,190,868. **Coil-Making Machine.** W. Deats, Yonkers, N. Y. Coil is wound circular, stretched into straight loop and then bent.

1,190,869. **Quench-Spark Discharger.** L. DeForest, assignor to DeForest Radio Telephone & Telegraph Co., New York, N. Y. Electrodes in vapor of carbon tetrachlorid.

1,190,872. **Fishing Apparatus.** F. E. Dildine, Columbus, O. Has electric lights on pole and float.

1,190,878. **Method of Operating Electric Batteries.** P. A. Emanuel, Aiken, S. C. Electrolyte and depolarizer are circulated in opposite directions.

1,190,879. **Method of Regenerating Electric Batteries.** P. A. Emanuel. A salt is supplied to battery, circulated under hydrogen pressure and battery connected in a circuit.

1,190,880. **Electric Cell.** P. A. Emanuel. Has spherical electrodes one within the other.

1,190,884. **Safety Device.** E. L. Gale, assignor to Otis Elevator Co., Jersey City, N. J. Circuit of elevator motor broken if brake not released.

1,190,886. **Electrolytic Condenser or Electrolytic Valve.** G. Giles, Fribourg, Switzerland. Of type having cylindrical armatures wound around central axis.

1,190,888. **Switching Mechanism.** D. D. Gordon, assignor to Yost Electric Mfg. Co., Toledo, O. For lamp sockets.

1,190,903. **Electrical Switch.** B. D. Horton, Detroit, Mich. Iron-clad, knife-blade structure.

1,190,922. **Trolley.** M. Lev, Jr., Los Angeles, Cal. Wheel-contacting details in special structure.

1,190,923. **Controlling Mechanism for Induction Motors.** D. L. Lindquist, assignor to Otis Elevator Co., Jersey City, N. J. Starting resistance controlled by vibrator controlled by periodicity of current in motor.

1,190,924. **Alternating-Current Motor Control.** D. L. Lindquist, assignor to Otis Elevator Co. Speed of hoist controlled by load.

1,190,931. **Terminal Connector.** W. C. Maynard, Miami, Fla. For connection to binding posts of dry cells, etc.

1,190,938. **Spark-Plug.** A. R. Mosler, assignor to A. R. Mosler Co., Yonkers, N. Y. Structural details.

1,190,943. **Synchronizing Apparatus.** E. E. Norton, assignor to J. A. Whitman, New York, N. Y. For synchronizing moving picture and phonograph records.

1,190,969. **Controlling Apparatus for Elevators.** W. C. Strang, assignor to Otis Elevator Co., New York, N. Y. Inertia device controls speed of motor at starting and stopping.

1,190,973. **Transmitting Means for Wireless Telegraphy.** C. M. Anger, Sacramento, Cal. Rotary contactor has peripheral contact sections corresponding to signal characters.

1,190,978. **Temperature-Measuring Device for Surgical Instruments.** L. D. Bliss, Takoma, Md., assignor of one-half to H. R. Bliss, New York, N. Y. Electrical thermometer has controlling coil in operating head.

1,190,982. **Electrode for Storage Batteries.** C. C. Carpenter, assignor to U. S. Light & Heat Corporation, Niagara Falls, N. Y. Plante plate has central stiffening stratum of antimonious lead.

1,190,988. **Machine for Forming Storage-Battery Plates.** F. Engel, assignor to U. S. Light & Heat Corporation. For refining the crystalline structure and increasing the surface of lead blanks for Plante plates.

1,190,989. **Storage-Battery Plate and Process of Forming the Same.** F. Engel, assignor to Light & Heat Corporation. Particular form of Plante plate formed from lead blank.

1,190,990 and 1,190,991. **Machine for Forming Storage-Battery Plates.** F. Engel, assignor to U. S. Light & Heat Corporation. Machines for working blanks to form Plante plates.

1,191,005. **Safety Trolley Harp.** W. A. Jenkins and P. J. Lincoln, Birmingham, Ala. Structural details.

1,191,023. **Apparatus for Displaying Advertisements, Signaling and the Like.** J. Naylor Dulwich, London, England. Board has removable units comprising lamps and display elements.

1,191,024. **Fire Alarm.** J. T. Nelson, Belton, S. C., assignor of one-half to G. H. Clement, Belton, S. C. Operated by weights supported by combustible cords.

1,191,054 and 1,191,055. **Trolley Stand.** M. A. Yeakley, assignor to J. E. McLain, Canton, O. Details of structures for car roofs.

1,191,058. **Shade-Holding Socket.** F. Barr, Woodhaven, N. Y. Shade support integral with socket shell.

1,191,060. **Terminal Box.** W. L. Bliss, assignor to U. S. Light & Heat Corporation, Niagara Falls, N. Y. For securing to generator casing.

1,191,070. **Electric Battery.** P. A. Emanuel, Aiken, S. C. Manner of supplying and circulating depolarizer.

1,191,073. **Sextant.** P. H. Hammond, U. S. Navy. Has lamp on indicator arm.

1,191,076. **Egg-Candling Device.** L. I. Heilbrun, Sagamore, Pa. Mounting of lamp and reflector.

1,191,078. **Armored-Cable Coupling.** R. M. Hutton, Philadelphia, Pa. Manner of securing armor to screw coupling.

1,191,083. **Electric Machine.** C. F. Kettering, assignor to Dayton Engineering Laboratories Co., Dayton, O. Distributer mechanism.

1,191,087. **Train-Control System.** E. A. Laughon, Roanoke, Va. Block signal.

1,191,129. **Regulator for Use in Charging Accumulator Cells for Motor Car Lighting and Starting and for Similar Purposes.** W. H. Scott, Norwich, England. Variable resistance device, comprising carbon blocks with electromagnet-controlling pressure.

Electrical Patents Issued July 18, 1916

Prepared by Thomas Howe, Patent Attorney, 2 Rector Street, New York, N. Y.

1,191,140. **Sleet-Scraper for Trolley Wires.** W. H. Ahrens, Canandaigua, N. Y. Scraper carried by band secured to harp and extending over trolley wheel.

1,191,145. **Kinetoscope.** F. E. Baldwin, assignor to Palmer Motion Picture Company, New York, N. Y. Mounting of lamp and reflector.

1,191,146. **Circuit-Breaker.** H. S. Beakes, assignor to Union Switch & Signal Co., Swissvale, Pa. Has overload coil and differential magnet inductively energized from overload coil.

1,191,149. **Insulated Switch-Rod.** F. B. Bradley, Chicago, Ill., assignor to Ajax Forge Co. For operating track switches.

1,191,152. **Automatic Trunk Selector.** A. M. Bullard, assignor to Western Electric Co., New York, N. Y. Details of structure of device for telephone systems.

1,191,158. **Electrical System.** F. Conrad, assignor to Westinghouse Electric & Mfg. Co., E. Pittsburgh, Pa. Intercommunicating telephone system utilizes wires of energy-distribution system.

1,191,162. **Spark-Plug.** L. P. Dixon, New York, N. Y. Has all live parts inclosed.

1,191,167. **Relay.** J. Erickson, assignor to Automatic Electric Co., Chicago, Ill. Mounting and adjustment of armature in two-magnet structure.

1,191,177. **Electric Metering System.** V. S. Hardey, Chicago, Ill. Register operated by a number of meters.

1,191,182. **Dictograph Apparatus.** W. Heymann, Washington, D. C. Adapted to be concealed upon the person.

1,191,186. **Insulator.** R. P. Jackson, assignor to Westinghouse Electric & Mfg. Co., E. Pittsburgh, Pa. Line insulator built up of nested units.

1,191,192. **Receptacle Closure.** C. J. Klein, assignor to Cutler-Hammer Mfg. Co., Milwaukee, Wis. Face plate for receptacles.

1,191,193. **Combined Spark-Plug and Vaporizer.** M. Klein and H. N. Porter, Denver, Colo. Jet of fuel projected against heater near spark-plug.

1,191,196. **Electric-Oven Heating Unit.** F. Kuhn and F. E. Shailor, assignors to American Electrical Heater Co., Detroit, Mich. Resistor mounted in false bottom.

1,191,197. **Electric Stove.** F. Kuhn and F. E. Shailor, assignors to American Electrical Heater Co., Detroit, Mich. Structure and mounting of disk-shaped heating unit.

1,191,205. **Mechanism for Controlling Automatic Musical Instruments.** F. L. McCormick, assignor to Rudolph Wurlitzer Mfg. Co., North Tonawanda, N. Y. Coin-controlled.

1,191,209. **Induction-Motor Winding.** F. S. Martin, assignor to Westinghouse Electric & Mfg. Co. Split bars spread into diamond shape and bound in place by rings engaging their hooked ends.

1,191,210. **Telephone Intercommunicating and Supervisory System.** T. G. Martin, assignor to Automatic Electric Co., Chicago, Ill. Details of apparatus and circuits.

1,191,238. **Electrical Heating Unit.** F. E. Shailor, assignor to F. Kuhn, Detroit, Mich. Resistor between insulating sheets and armour of corrugated metal.

1,191,249. **Self-Winding Clock.** W. J. V. Osdel, Chicago, Ill., assignor of one-half to L. Sperling, Chicago, Ill. Electromagnet returns gravity-actuating device.

1,191,253. **Internal-Combustion Engine.** W. B. S. Whaley, assignor to OK Reversing Gas Engine Co., Tulsa, Okla. Special relation of timer interrupter and valve mechanism.

1,191,262. **Electrical Block-Signaling Apparatus for Railways.** B. F. Wooding, Denver, Colo. Sounds alarm on train.

1,191,265. **Telephone-Exchange System.** J. L. Wright, assignor to Western Electric Co. Automatic switch operated in response to audible signals from calling line.

1,191,273. **Automatic Resistance-Controller.** L. Bradley, Milwaukee, Wis. Thermostatic control of compressible resistance.

1,191,278. **Automobile Signaling Apparatus.** J. L. Cayer, assignor to Cayer Signal Co., Chicago, Ill. Mounting of lamp in rotatable transparent indicator.

1,191,284. **Electric Switch.** W. B. Crossland, Newport, Ark. Variable liquid resistance.

1,191,286. **Electric Cooking Apparatus.** F. V. Detwiler, Chicago, Ill. Electromagnetic mechanism for making and breaking the circuit at certain temperatures.

1,191,289. **Arc-Lamp.** W. Dietz, assignor to Korting and Mathiesen, Aktiengesellschaft Leutzsch, Germany. Amount of light given by series lamps controlled by momentarily varying current from normal.

1,191,290. **Power-Transmitting Mechanism.** H. S. Dillon and M. C. Gass, San Francisco, Cal. For automobiles; electromagnetically controlled.

1,191,300. **Automatic Electrolytic Cell.** J. M. Goldman, St. Louis, Mo. Structure of electrodes.

1,191,304. **Apparatus for Sterilizing Water By Means of Ultra-Violet Rays.** A. Helbronner, assignor to R. U. V. Co., New York, N. Y. Arrangement of lamp and water circulation.

1,191,326. **Electric Switch.** J. F. McElroy, assignor to Consolidated Car-Heating Co., Albany, N. Y. Inclosed, reciprocating switch.

1,191,327. Partition Junction Box. J. F. McElroy, assignor to Consolidated Car-Heating Co. For mounting in partition wall.

1,191,336. Thermostatic Switch. C. C. Muckois, assignor to Consolidated Car-Heating Co. Details of structure in which thermostatic element is corrugated expansible tube containing vaporizable liquid.

1,191,347. Lock. E. A. Rupert, Aberdeen, Wash. Inter-related magnetically controlled bolts for separate doors to a case.

1,191,356. Replenishing Electrolytic Cells. W. S. Smith, assignor to Pennsylvania Salt Mfg. Co., Philadelphia, Pa. Process of maintaining constant level of electrolyte.

1,191,358. Electrical Appliance. S. E. Spaulding, Milton, Wash. Neck band for medical use.

1,191,381. Railway Safe-Running Device. A. R. Angus, Slit Road Mosman, New South Wales, Australia. Warning and stopping device on train controlled by track contacts.

1,191,386. Apparatus for Use in and in Connection With Electrolytic Processes. A. E. Battle, Aldgate, London, England. Apparatus for handling disconnected sheet members.

1,191,400. Burglar Guard. E. O. Cilley, Conklin and Ithiel J. Cilley, Grand Rapids, Mich. Electromagnets controlling discharge of volatile liquid through openings in front of counter.

1,191,414. Safety Block Signal. G. W. Gerlach, Cumberland, Iowa. Track contacts control two blocks in advance and one in rear to provide overlapping system.

1,191,416. Measuring Apparatus. G. H. Gibson, Montclair, N. J. Fluid flow meter.

1,191,426. Electrically Heated Utensil. D. C. G. Hughes, Chicago, Ill. Heating structure for attachment to bottom of utensil.

1,191,429. Spark-Plug and Sparking Circuit. L. H. Jensen, St. Charles, Ill. Plug as number of gaps in series and a dead-ended conductor projecting from an intermediate electrode.

1,191,435. Process for the Electric Melting of Metals. C. A. Keller, Paris, France. Molten steel treated in electric furnace.

1,191,461. Signaling Horn. M. S. Purple, assignor to Bevin Brothers Mfg. Co., East Hampton, Conn. Shape of sound-amplifying horn.

1,191,476. Magneto Driving Connection. P. Rudolph and J. A. Lund, assignors to Splitdorf Electrical Co., Newark, N. J. Gearing.

1,191,482. Coupler for Electric Musical Instruments. M. L. Severy and G. R. Sinclair, assignors to Choralcelo Co., Boston, Mass. Electromagnetic devices for operating and controlling tuned sonorous bodies as piano strings.

1,191,495. Method for Separating Neon from Gases With Which It Is Mixed. G. Claude, Boulogne-sur-Seine, France. Method of obtaining neon purified from nitrogen, oxygen, helium, etc., in a closed vessel.

1,191,507. Attachment for Telephone Mouthpieces. J. A. Hall, San Diego, Cal. For securing disinfecting pad.

1,191,528. Lamp Signaling Arrangement. A. H. Midgley, Action Vale, assignor of one-half to C. A. Vandervell, Action Vale, England. Lamp, shutter and reflector on pistol-shaped holder controlled by trigger.

1,191,548. Connector for Storage Batteries. T. A. Willard, assignor to Willard Storage Battery Co., Cleveland, O. For connecting conductor to battery terminal. (See cut.)

1,191,549. Magnetic Tube-Sawing Machine. H. M. Wilson, Pittsburgh, Pa. Tubes held in position electromagnetically.

1,191,552. Making Tungsten Filaments. A. Aeuer, assignor to General Electric Co., Schenectady, N. Y. Oxygen compound of tungsten heated in ammonia atmosphere and nitrogen compound decomposed to give metallic tungsten.

1,191,553. Adjustable Mounting for Automobile Starting-Motors and Generators. H. S. Baldwin, assignor to General Electric Co. Includes a three-point suspension.

1,191,562. Welding Hood. W. L. Callahan, assignor to C. & C. Electric & Mfg. Co., Garwood, N. J. For protecting operator in arc welding.

1,191,571. Protective Device. E. E. F. Creighton, assignor to General Electric Co. Magnetic blowout. (See cut.)

1,191,601. Electrical Heater. J. F. Lamb, assignor to Landers, Frary & Clark, New Britain, Conn. Mounting of resistor in heating utensil.

1,191,602. Device to Prevent Skidding. J. G. V. Lang, assignor to General Electric Co. If one of number of motors, arranged for regeneration, skids, its field is reduced.

1,191,603. Spark-Plug for Internal-Combustion Engines. R. D. Loose, Fort Worth, Tex. Particular structure of electrodes.

1,191,611. System for Preventing Electrolysis. W. B. Potter, assignor to General Electric Co. Automatic booster system regulates according to potential between railway rail and pipes, etc., to divert current from latter.

1,191,619. Electric Cutout. H. R. Sargent, assignor to General Electric Co. Details of inclosed fuse.

1,191,620. Electric Shot-Firing Device. E. Schietzel, Arma, Kans. Electromagnetic structure.

1,191,624. Adjustable Mounting for Automobile Starting-Motors and Generators. G. E. Stevens, assignor to General Electric Co. Details of supporting means.

1,191,625. Controlling Mechanism for Automobiles. G. E. Stevens, assignor to General Electric Co. Circuit of starting motor interlocked with transmission.

1,191,626. Starting and Lighting Set for Automobiles. G. E. Stevens, assignor to General Electric Co. Mounting and gearing of electric machines.

1,191,627. System for the Prevention of Electrolysis. J. B. Taylor, assignor to

No. 1,191,548.—Connector for Storage Batteries.

General Electric Co. Modification of No. 1,191,611.

1,191,630. Composition of Glass. E. Weintraub, assignor to General Electric Co. For vapor electric tubes.

1,191,641. Electric-Lamp Socket. H. H. Willetts, Tetreaultville, Quebec, Canada. Shell and cap integral with casing divided lengthwise.

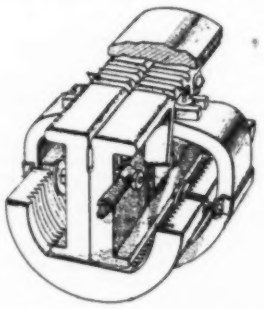
1,191,649. Conduit Rosette for Electric Wiring. A. Barthels, San Francisco, Cal. Structure for securing in box wall.

1,191,650. Adjustable Reflector. A. Baumgarten, assignor of one-third to H. L. Kitselman and one-third to W. H. Schaufelberger, Muncie, Ind. For headlight.

1,191,690. Vacuum Lightning-Arrester. J. T. Greene, assignor to National Electric Specialty Co., Toledo, O. Mounting and connection of carbon blocks in evacuated glass vessel.

1,191,703. Electric-Resistance Thermometer. F. Johannsmeyer, assignor to C. C. Thomas, Madison, Wis. Resistance element for mounting in conduit to measure temperature of fluid.

1,191,743. Electric Water-Heater. M. Simon, St. Louis, Mo. Water passed about bafflers in tubular receptacle with elec-



No. 1,191,571.—Protective Device.

trodes in its ends, with circuit-breaker controlled thermostatically and by withdrawal of water.

1,191,744. Portable Lamp. G. W. Stanton and R. H. Frye, Athens, Tenn. Lamp on telescopic arm extending from support carrying battery and switch.

1,191,745. Time Switch. A. Streng, Indianapolis, Ind., assignor of one-half to M. J. Duffecy, Indianapolis, Ind. Clock controlled.

1,191,749. Electric Train-Stop System. T. W. Vickers, Forsyth, Mont. Block system.

1,191,759. Electric Conversion. S. Cabot, Brookline, Mass. From polyphase to direct currents.

1,191,783. Keyhole-Illuminating Apparatus. P. R. Harsh, Toledo, O. Lamp lighted by button adjacent keyhole and key closes contacts in alarm circuit.

1,191,796. Trolley Pole. O. R. Kirkpatrick, Fort Worth, Tex. Details of structure and mounting.

1,191,799. Process of Producing Alkali Metals. H. Labhardt, assignor to Badische Anilin & Soda Fabrik, Ludwigshafen-on-the-Rhine, Germany. By electrolysis of molten caustic alkali.

1,191,812. Electric-Lamp-Socket Casing. H. J. Morey, Syracuse, N. Y. Structure of cap.

1,191,844. Translating Device. W. R. Sorgel and W. H. Gaulke, assignors to International Electric Tool Co., Milwaukee, Wis. System for alternately energizing coils for reciprocating plunger.

1,191,856. Interrupter for Ignition Dynamos. H. Randolph Van Deventer, assignor to Splitdorf Electrical Co., Newark, N. J. Special structure incorporated in dynamo unit.

1,191,914. Electrical Winding Device for Clock Movements. E. M. Thompson, Beloit, Wis. Structural details of impulse operated magnetic structure.

1,191,917. Telephone Trunking and Supervisory System. W. L. Campbell, assignor to First Trust and Savings Bank, Chicago, Ill. Automatic system comprising special service line.

1,191,924. Electric Switch. J. F. Burns, Philadelphia, Pa. Mechanism for operating inclosed knife-switch from exterior of box.

1,191,933. Means for Synchronizing Rotary Devices. G. M. Yorke and G. R. Benjamin, assignors to Western Union Telegraph Co., New York, N. Y. For synchronous telegraph system.

1,191,934. Locking Means for Incandescent Lamps. H. Altshul, Hartford, Conn. Lamp cannot be removed without breaking contact piece from terminal.

Reissue. 14,166. Steering Wheel. R. H. Scheibert, assignor to Safety Electric Rim Co., Middletown, O. Original No. 1,103,438, dated July 14, 1914. Arrangement of series of push buttons and electrical conductors on rim.

PATENTS EXPIRED.

The following United States electrical patents expired on July 25, 1916:

629,325. Secondary Battery. R. Ashley, Port Republic, N. J.

629,340. Electrical Hair Brush. A. J. Cook, Jersey City, N. J.

629,363. Accumulator Plate. H. F. Hobel, Berlin, Germany.

629,371. Storage Battery. C. W. Kennedy, Rutledge, Pa.

629,372. Storage Battery. C. W. Kennedy, Rutledge, Pa.

629,373. Cover for Junction Boxes. E. Kern and C. Claflin, New York, N. Y.

629,394. Process of Reducing Metallic Compounds and Producing Metallic Carbides. I. L. Roberts, New York, N. Y.

629,397. Automatic Magnetic Circuit-Breaker. W. M. Scott, Philadelphia, Pa.

629,398. Controller for Electric-Motor Cars or Vehicles. S. H. Short, Cleveland, O.

629,399. Controlling Apparatus for Electric Motors. S. H. Short, Cleveland, O.

629,406. Adjustable Hanger for Incandescent Lamps. W. N. Thorp and F. G. Normart, Fresno, Cal.

629,424. Arc-Lamp. E. M. Cashion, Glens Falls, N. Y.

629,435. Third-Rail Electric-Railway System. J. R. Farmer, St. Louis, Mo.

629,445. Plug-Receptacle for Electric Circuits. J. T. Hunt, New York, N. Y.

629,504. Motor Apparatus for Looms, A. B. Herrick, Ridgewood, and W. M. Brock, Paterson, N. J.

629,508. Insulated Conductor. J. N. Keller, Newton, Mass.

629,521. Motor Vehicle. L. J. Phelps, New Brunswick, N. J.

629,580. Time Stamp. E. R. Malmborg, Chicago, Ill.

629,584. Station Potential Indicator. R. D. Mershon, New York, N. Y.

629,603. Electric Arc-Lamp. P. F. H. Queisser, Charlottenberg, Germany.

629,624. Electric Signal. W. H. Stillwell, Topeka, Kan.

629,631. Electric-Headlight Lamp. H. P. Wellman, Ashland, Ky.

629,638. Electric Door-Opener. A. F. T. Wiechers, New York, N. Y.

629,645. Telegraph Sounder. J. S. Baynard, New York, N. Y.

629,663. Fuse Block for Electric Circuits. H. P. Davis, Pittsburgh, Pa.

629,664. High-Tension Circuit-Breaker. H. P. Davis, Pittsburgh, and G. Wright, Wilkinsburg, Pa.

629,665. Controller for Electric Motors. H. P. Davis, Pittsburgh, and G. Wright, Wilkinsburg, Pa.

629,682. Condenser. P. C. Hewitt, New York, N. Y.

629,685. Electrolytical Production of Zinc or Other Metals. C. Hoepfner, Berlin, Germany.

629,686. Process of Extracting Zinc From Its Ores. C. Hoepfner, Berlin, Germany.